State of California
The Resources Agency
Department of Water Resources

RECREATION ACTIVITY, SPENDING, AND ASSOCIATED ECONOMIC IMPACTS
FINAL

R-18

Oroville Facilities Relicensing
FERC Project No. 2100

MAY 2004

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FERC Project No. 2100

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REPORT SUMMARY

This document presents the results of the Relicensing Study R-18 – *Recreation Activity, Spending, and Associated Economic Impacts*, one of two socioeconomic studies conducted to support the Oroville Facilities Relicensing (Federal Energy Regulatory Commission [FERC] Project No. 2100). The California Department of Water Resources (DWR) commissioned this study as part of the relicensing process for the preparation of a license application to be submitted to FERC for the Oroville Facilities.

As part of the relicensing process, a series of related studies is being conducted to gather information on project-related recreation activities associated with the Oroville Facilities. This report presents the results of one of those studies: to estimate existing and projected future economic effects from project-related recreation and operations and maintenance activities on communities in Butte County. This report was prepared under the general direction of DWR staff. Opinions, findings, and conclusions expressed in this report are those of the authors. This report does not express the official position of DWR unless specifically approved by the Director or his designee.

INTRODUCTION

This *Recreation Activity, Spending, and Associated Economic Impacts* study focuses on characterizing existing spending by persons recreating at the Oroville Facilities and expenditures made by State agencies for operations and maintenance (O&M) of the Oroville Facilities, and estimating current employment opportunities and earnings supported by recreation- and O&M-related spending in Butte County. Additionally, this study estimates future changes in employment and earnings resulting from changes in recreation activity and related spending caused by projected growth in visitation to the Oroville Facilities. Economic effects are evaluated at the community and County (Butte County) level. The study area includes communities in close proximity to the Oroville Facilities, including the greater Oroville area; the cities of Gridley, Biggs, and Chico; and the Town of Paradise. For this analysis, these communities are grouped into four economic model areas: Oroville Model Area, Chico Model Area, Biggs-Gridley Model Area, and Paradise Model Area.

NEED FOR THIS STUDY

DWR is currently in the process of renewing its license for the Oroville Facilities. FERC is responsible for granting the license and requires the applicant, DWR, to assess various resources, including recreation and socioeconomic resources. This study complies with FERC direction for preparing socioeconomic exhibits. Specifically, FERC guidelines direct that “estimates should be provided for changes in employment and income associated with any anticipated modifications to recreation use in the Study Area, such as whitewater rafting, boating, or fishing.” Because this study focuses on local economic effects of recreation activity at the Oroville Facilities, the study also will help DWR meet FERC’s direction regarding preparation of a comprehensive recreation plan.

STUDY OBJECTIVES

The primary objective of the *Recreation Activity, Spending, and Associated Economic Impacts* study is to estimate the effects of spending activity generated by current and projected recreation use and O&M of the Oroville Facilities on local business sales, employment, and personal income. A secondary objective of the study is to gain a better understanding of the relationship between the Oroville Facilities and economic development and growth within the region, particularly focused on the greater Oroville area. This understanding establishes an analytical framework for evaluating effective recreation development strategies for potentially enhancing economic conditions in the region.

METHODOLOGY

To estimate the effects of spending generated by current and projected recreation use and O&M of the Oroville Facilities, community-level economic impact assessment models were developed for four community areas: the Oroville Model Area, the Chico Model Area, the Paradise Model Area, and the Biggs-Gridley Model Area. The models, which were developed in consultation with a Socioeconomics Technical Review Team for Oroville Facilities Relicensing, were constructed employing basic economic modeling data at the County level available from the Minnesota IMPLAN Group (Minnesota IMPLAN Group 2002). These economic modeling data were verified and modified using additional economic information gathered at the local level. Current and projected future levels of recreation-related sales and current levels of O&M expenditures related to the Oroville Facilities were input to the models to generate estimates of total sales, employment, and earnings in each of the model areas. Model inputs were developed using data on visitation levels, visitation patterns, and expenditures gathered through recreation user surveys conducted for the relicensing process.

STUDY RESULTS AND DISCUSSION

Effects of Current Recreation Activity and O&M Expenditures

Local Project-related economic effects primarily result from recreation activity and O&M of the Oroville Facilities. As recreation-related spending levels vary in relation to use, local employment and earnings generated by miscellaneous retail sales, hotel and motel stays, fuel purchases, and other expenditures by visitors also change. Similarly, changes in O&M expenditures by State agencies also generate economic activity in local areas. Based on current visitation levels, visitor spending is estimated to range from about $1.4 million in the Biggs-Gridley Model Area to about $20.4 million in the Oroville Model Area (Table RS-1). Countywide, spending associated with current recreation activity at the Oroville Facilities is estimated to total $30.7 million annually, with $11.9 million being spent by recreationists who reside outside of Butte County.

Table RS-1. Summary of current recreation-related spending in Butte County by County residents and out-of-County visitors to the Oroville Facilities.

Study Impact Area	Butte County Residents		Out-of-County Visitors		Total Spending ($1,000)
	Amount ($1,000)	% of Total	Amount ($1,000)	% of Total	
Oroville	10,163.8	54.1	10,265.9	86.3	20,429.7
Paradise	4,182.7	22.3	634.2	5.3	4,817.0
Biggs-Gridley	761.9	4.1	597.0	5.0	1,358.9
Chico	3,674.3	19.6	392.4	3.3	4,066.6
Butte County Total	18,782.7	100.1	11,889.5	99.9	30,672.2

Note: Spending by Butte County residents in each community includes spending by residents of that community and spending by other Butte County residents (i.e., nonlocal residents) in that community.

Existing activities and patterns of use related to the Oroville Facilities result in differing economic effects on communities in Butte County. As expected, the largest economic effects are in the Oroville Model Area, where most of the Oroville Facilities are located and where many of the State employees who operate and maintain the facilities reside. Spending associated with recreation activity at the Oroville Facilities by out-of-area visitors currently generates an estimated 453 jobs, while O&M expenditures generate an additional 319 jobs in the Oroville Model Area (Table RS-2). Current earnings from recreation activity-related spending and O&M expenditures are estimated to total $8.6 million and $10.6 million, respectively, in the Oroville Model Area.

RS-2. Summary of jobs and earnings effects generated by recreation-related spending and operation and maintenance of the Oroville Facilities.

Study Impact Area	Recreation Spending Induced				Operation and Maintenance Induced			
	Jobs		Earnings		Jobs		Earnings	
	Number of Jobs	% of Total	Amount ($1,000	% of Total	Number of Jobs	% of Total	Amount ($1,000)	% of Total
Oroville	453	68.4	8,598.3	67.0	319	64.1	10,600.4	69.9
Paradise	37	5.6	725.7	5.7	37	7.4	1,138.3	7.5
Biggs-Gridley	22	3.3	364.4	2.8	17	3.4	505.5	3.3
Chico	150	22.7	3,144.6	24.5	125	25.1	2,927.3	19.3
Butte County Total	662	100.0	12,833.0	100.0	498	100.0	15,171.5	100.0

Note: Effects on jobs and earnings generated by recreation spending reflect spending in community areas by all persons who live outside the community, including persons who live elsewhere in Butte County and who live outside of Butte County.

Existing economic effects in the Chico Model Area, which benefits by being a regional retail and services center, are estimated to include 150 jobs generated by recreation-related spending of visitors and 125 jobs related to O&M expenditures. Earnings related to these jobs are estimated to total $6.1 million. Economic effects of recreation activity-related spending by visitors and O&M expenditures are estimated to be 74 jobs in the Paradise Model Area and 39 jobs in the Biggs-Gridley Model Area. Earnings in the Paradise and Biggs-Gridley areas generated by recreation activity-related spending

and O&M expenditures are estimated to total about $1.9 million and $870,000, respectively.

Countywide, the spending by persons who recreate at the Oroville Facilities but who do not reside in Butte County currently generates an estimated 555 jobs and $10.6 million in annual earnings. O&M activities are estimated to generate an additional 498 jobs and $15.2 million in annual earnings within the County.

Effects of Projected Future Recreation Activity

Based on projected growth in visitation to the Oroville Facilities developed for Relicensing Study R-12 – *Projected Recreation Use*, spending by all visitors to the facilities is projected to total $38.8 million in 2020, including $15.0 million in spending by visitors coming from outside of Butte County. Similar to current spending patterns, 66 percent of Countywide spending associated with recreation activity at the Oroville Facilities is estimated to occur within the Oroville Model Area in 2020. Within Butte County, economic activity supported by the spending of out-of-County visitors is estimated to generate about 700 jobs and $13.4 million in earnings in 2020, reflecting a 26 percent increase in economic activity relative to current activity levels. Jobs and earnings associated with recreation activity at the Oroville Facilities would continue to be greatest in the Oroville Model Area, with 571 jobs estimated to be generated by out-of-area visitor spending in 2020.

CONCLUSIONS

Effects of Current Recreation Activity and O&M Expenditures

The *Recreation Activity, Spending, and Associated Economic Impacts* study reveals that recreation activity and O&M expenditures related to the Oroville Facilities contribute varying amounts to the economic bases of communities in Butte County. As expected, recreation- and O&M-related activity contributes the most to the economy of the Oroville Model Area. Combined, recreation and O&M activities account for an estimated 772 jobs in the Oroville Model Area, or 4.2 percent of the area's total employment. Earnings associated with these activities ($19.2 million) account for 4.7 percent of the Oroville Model Area's total earnings.

Current levels of recreation activity and O&M expenditures have relatively smaller effects on the economies in the Chico, Paradise, and Biggs-Gridley Model Areas. Although out-of-area visitor spending and O&M expenditures annually support about 275 jobs and $6.1 million in earnings in the Chico Model Area, this level of economic activity accounts for less than 1 percent of total jobs and earnings in the area. Similarly, the number of jobs and earnings in the Paradise and Biggs-Gridley Model Areas generated by recreation activity of out-of-area visitors and O&M expenditures account for less than 1.0 percent of all jobs and earnings in these areas.

Countywide, current levels of recreation activity and O&M related to the Oroville Facilities contribute a relatively small but important increment to the County's economic base. Combined, spending by out-of-area visitors and O&M-related expenditures account for an estimated 1,160 jobs and about $28.0 million in annual earnings. When viewed in the context of the Butte County economy, these levels of employment and earnings account for about 1.2 percent of total Countywide employment and about 1.3 percent of total Countywide earnings. Recreation activity-related spending by local residents also supports jobs and earnings in local businesses that rely on this spending.

Effects of Projected Future Recreation Activity

Countywide, jobs and earnings generated by recreation activity at the Oroville Facilities by out-of-area visitors is estimated to increase by 26 percent between 2003 and 2020, which is less than the projected increase in population growth in Butte County. Assuming that the economies of the community modeling areas within Butte County grow at rates similar to the projected population growth by 2020, the economic effects generated by out-of-area visitor spending would account for a smaller share of the economies of each area. Currently, spending by out-of-area visitors account for about 4.2 percent of the jobs in the Oroville Model Area and less than one percent of the jobs in the Paradise Model Area, Chico Model Area, and the Biggs-Gridley Model Area. Countywide, out-of-area spending accounts for about 1.2 percent of the jobs in the County.

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ACRONYMS

af	acre-feet
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
Caltrans	California Department of Transportation
CCD	Census County Division
CDF	California Department of Forestry and Fire Protection
cfs	cubic feet per second
DFG	California Department of Fish and Game
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
DUA	Day Use Area
FEA	functional economic area
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
IMPLAN	Impact Analysis for Planning
I-O	input-output
ISO	Independent System Operator
maf	million acre-feet
msl	mean sea level
MW	megawatts
NASS	National Agricultural Statistical Service
NOAA	National Oceanic and Atmospheric Administration
O&M	operations and maintenance
OWA	Oroville Wildlife Area
REIS	Regional Economic Information System
RM	River Mile
SMA	Standard Metropolitan Area
SWP	State Water Project
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture

1.0 INTRODUCTION

An economic impacts study typically characterizes existing economic conditions within a region (or community) and quantifies changes in economic activity, as measured by sales, employment, and personal income, associated with an action that alters the level of economic activity within the region. This study describes how economic activity generated by recreation use and government spending associated with the operations and maintenance (O&M) of the Oroville Facilities affects local and regional economic conditions.

The primary purpose of the study is to develop analytical tools (or models) for assessing the existing and future economic effects of the Oroville Facilities. This includes economic impacts of visitors, impacts of State spending associated with O&M activity, and the effects of potential recreation development and enhancement scenarios. These scenarios may involve recreation facility development or resource enhancements that would affect recreation use and management.

Following this Introduction, which includes relevant background information, identifies the study area, and describes the Oroville Facilities, the study report details the methodology used to develop the economic impact model and describes results from using the model to assess the economic impacts of existing and projected future (year 2020) recreation activity at the Oroville Facilities and current operations and maintenance of the Oroville Facilities. These analyses serve as “baseline” conditions for subsequently evaluating resource actions that would change levels of recreation activity at the Oroville Facilities or O&M requirements of the Oroville Facilities.

In addition to these study elements, the report includes a Conclusions section followed by references cited in the methodology description. Appendix A includes a detailed description of the structure of the economic impact assessment models, including key inputs, outputs, and data sources used to develop the spreadsheet model. An electronic version of the spreadsheet model also is available upon request. Appendix B includes a description of the data processing procedures and results of developing the visitor spending profiles used in the analysis. Appendix C includes employment and earning multipliers and economic impact factors for the study area. Although this report does not include a glossary of terms, one is available on the California Department of Water Resources (DWR) website.

1.1 BACKGROUND INFORMATION

DWR, guided by the Oroville Facilities Relicensing Collaborative, commissioned this study as part of the relicensing process for the preparation of a license application to be submitted to the Federal Energy Regulatory Commission (FERC) for the Oroville Facilities (FERC Project No. 2100). As part of the relicensing process, a series of related studies is being conducted to assess and evaluate recreation and socioeconomic resources associated with the Oroville Facilities. This report addresses

the study objectives identified in Study Plan R-18, *Recreation Activity, Spending, and Associated Economic Impacts*.

1.1.1 Study Area

Economic impacts associated with recreation activity and operations and maintenance of the Oroville Facilities are evaluated at the community and County (Butte County) level. The study area (Figure 1.1-1) includes communities in close proximity to the Oroville Facilities, including the greater Oroville area; the cities of Gridley, Biggs, and Chico; and the Town of Paradise. For this analysis, these communities are grouped into four economic model areas: Oroville Model Area, Chico Model Area, Biggs-Gridley Model Area, and Paradise Model Area. Together, these four model areas, which include lands within the incorporated area and surrounding lands in the unincorporated area, comprise all of the land area of Butte County. The study area extends beyond the boundary of the FERC Project to capture the economic impacts resulting from expenditures by persons recreating at the Oroville Facilities and by O&M-related expenditures in nearby communities.

Economic impacts resulting from recreation-related expenditures also may be felt in other communities. These effects, however, are believed to be minimal and are only evaluated qualitatively in the study.

1.2 DESCRIPTION OF FACILITIES

The Oroville Facilities were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in Northern California, the San Francisco Bay area, the San Joaquin Valley, and Southern California. The Oroville Facilities are also operated for flood control and power generation, to improve water quality in the Delta, enhance fish and wildlife, and provide recreation.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, transmission lines, and a relatively large number of recreational facilities. An overview of these facilities is provided in Figure 1.2-1. Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-foot (maf) capacity storage reservoir with a surface area of 15,810 acres at its maximum normal operating level of 900 feet above mean sea level (msl).

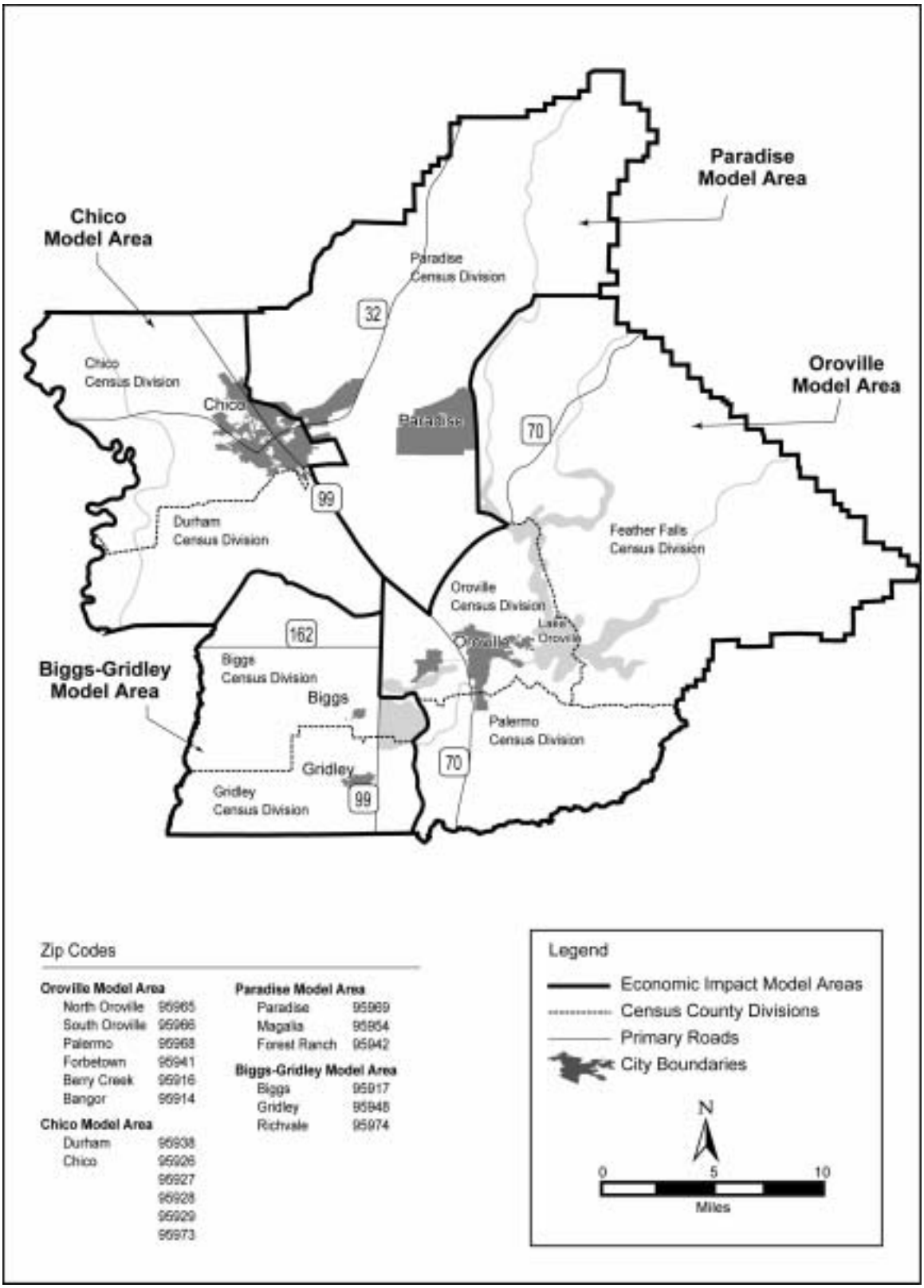

Figure 1.1-1. Economic impact study area.

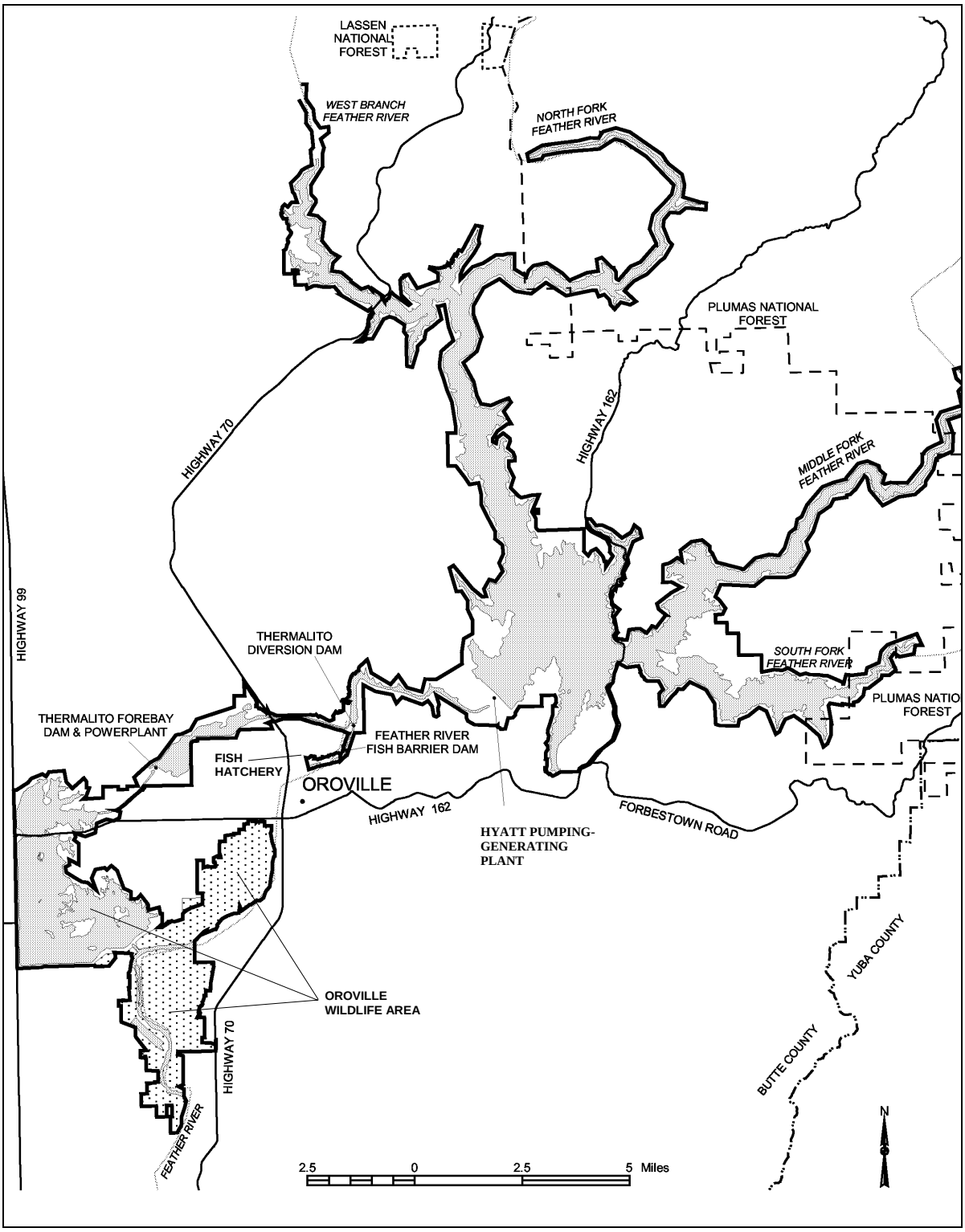

Figure 1.2-1. Oroville Facilities FERC Project 2100 boundary.

The hydroelectric facilities have a combined licensed generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cubic feet per second (cfs) and 5,610 cfs, respectively. Other generation facilities include the 3-MW Thermalito Diversion Dam Power Plant and the 114-MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, 4 miles downstream of the Oroville Dam, creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water into the Thermalito Power Canal. Thermalito Diversion Dam Powerplant is located on the left abutment of the diversion dam and releases a maximum of 615 cfs of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. Thermalito Forebay is an off-stream regulating reservoir for the Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into Thermalito Afterbay, which is contained by a 42,000-foot-long earthfill dam. The Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, and helps regulate the power system, provides storage for pump-back operations, provides recreational opportunities, and provides local irrigation water. Several local irrigation districts receive Lake Oroville water via the Afterbay.

The Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Thermalito Afterbay outlet, and provides attraction flow for the hatchery. The hatchery is an anadromous fish hatchery intended to compensate for salmon and steelhead spawning grounds made unreachable by construction of Oroville Dam. Hatchery facilities have a production capacity of 10 million fall-run salmon, 5 million spring-run salmon, and 450,000 steelhead annually (pers. comm., Kastner 2003). However, diseases have occasionally reduced hatchery production in recent years.

The Oroville Facilities support a variety of recreational opportunities. These opportunities include boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, and hunting. There are also visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, Lime Saddle, and Thermalito Forebay. Lake

Oroville has two full-service marinas, five car-top boat ramps, 10 floating campsites, and seven two-stall floating toilets. There are also recreation facilities at the Lake Oroville Visitors Center, Thermalito Afterbay, and OWA.

The OWA comprises approximately 11,000 acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area is adjacent to or straddles 12 miles of the Feather River, and includes willow- and cottonwood-lined ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including the Monument Hill Day Use Area (DUA), model airplane grounds, three boat ramps on the afterbay and two on the river, and two primitive camping areas. The California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry-land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a few locations.

1.3 CURRENT OPERATIONAL CONSTRAINTS

Operation of the Oroville Facilities varies seasonally, weekly, and hourly, depending on hydrology and the objectives that DWR is trying to meet. Typically, releases to the Feather River are managed to conserve water while meeting a variety of water delivery requirements, including flow, temperature, fisheries, diversion, and water quality. Lake Oroville stores winter and spring runoff for release to the Feather River as necessary for project purposes. Meeting the water supply objectives of the SWP has always been the primary consideration for determining Oroville Facilities operation (within the regulatory constraints specified for flood control, instream fisheries, and downstream uses). Power production is scheduled within the boundaries specified by the water operations criteria noted above. Annual operations planning is conducted for multi-year carryover storage. The current methodology is to retain half of the Lake Oroville storage above a specific level for subsequent years. Currently, that level has been established at 1.0 maf; however, this does not limit drawdown of the reservoir below that level. If hydrology is drier or requirements greater than expected, additional water could be released from Lake Oroville. The operation plan is updated regularly to reflect forecast changes in hydrology and downstream operations. Typically, Lake Oroville is filled to its maximum operating level of 900 feet above msl in June and then lowered as necessary to meet downstream requirements, to a minimum level in December or January (approximately 700 msl). During drier years, the reservoir may be drawn down more and may not fill to desired levels the following spring. Project operations are directly constrained by downstream operational demands and flood management criteria as described below.

1.3.1 Downstream Operation

An August 1983 agreement between DWR and DFG entitled *Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish &*

Wildlife (DWR and DFG 1983) sets criteria and objectives for flow and temperatures in the low-flow channel and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement: (1) establishes minimum flows between the Thermalito Afterbay outlet and Verona that vary by water year type; (2) requires flow changes under 2,500 cfs to be reduced by no more than 200 cfs during any 24-hour period (except for flood management, failures, etc.); (3) requires flow stability during the peak of the fall-run Chinook salmon spawning season; and (4) sets an objective of suitable temperature conditions during the fall months for salmon and during the spring/summer for shad and striped bass.

1.3.1.1 Instream Flow Requirements

The Oroville Facilities are operated to meet minimum flows in the lower Feather River as established by the 1983 agreement (see above). The agreement specifies that the Oroville Facilities release a minimum of 600 cfs into the Feather River from the Thermalito Diversion Dam for fisheries purposes. This is the total volume of flows from the diversion dam outlet, the diversion dam power plant, and the Feather River Fish Hatchery pipeline.

Generally, the instream flow requirements below Thermalito Afterbay are 1,700 cfs from October through March, and 1,000 cfs from April through September. However, if runoff for the previous April–July period is less than 1,942,000 acre-feet (af) (i.e., the 1911–1960 mean unimpaired runoff near Oroville), the minimum flow can be reduced to 1,200 cfs from October to February, and 1,000 cfs for March. A maximum flow of 2,500 cfs is not exceeded from October 15 through November 30 to prevent spawning in overbank areas that might later become dewatered.

1.3.1.2 Temperature Requirements

The Diversion Pool provides the water supply for the Feather River Fish Hatchery. The hatchery temperature objectives are 52°F for September, 51°F for October and November, 55°F for December through March, 51°F for April through May 15, 55°F for last half of May, 56°F for June 1–15, 60°F for June 16–August 15, and 58°F for August 16–31. In April through November, a temperature range of plus or minus 4°F is allowed for objectives.

There are several temperature objectives for the Feather River downstream of the Thermalito Afterbay outlet. During the fall months, after September 15, the temperatures must be suitable for fall-run Chinook salmon. From May through August, the temperatures must be suitable for shad, striped bass, and other fish.

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) has also established an explicit criterion for steelhead trout and spring-run Chinook salmon, memorialized in a biological opinion on the effects of the Central Valley Project and SWP on Central Valley spring-run Chinook and steelhead. As a reasonable and prudent measure, DWR attempts to control water

temperature at Feather River Mile (RM) 61.6 (Robinson's Riffle in the low-flow channel) from June 1 through September 30. This measure attempts to maintain water temperatures less than or equal to 65°F on a daily average. The requirement is not intended to preclude pump-back operations at the Oroville Facilities needed to assist the State of California with supplying energy during periods when the California Independent System Operator (ISO) anticipates a Stage 2 or higher alert.

The hatchery and river water temperature objectives sometimes conflict with temperatures desired by agricultural diverters. Under existing agreements, DWR provides water for the Feather River Service Area contractors. The contractors claim a need for warmer water during spring and summer for rice germination and growth (i.e., minimum 65°F from approximately April through mid-May, and minimum 59°F during the remainder of the growing season), though there is no explicit obligation for DWR to meet the rice water temperature goals. However, to the extent practical, DWR does use its operational flexibility to accommodate the Feather River Service Area contractors' temperature goals.

1.3.1.3 Water Diversions

Monthly irrigation diversions of up to 190,000 af (July 2002) are made from the Thermalito Complex during the May–August irrigation season. The total annual entitlement of the Butte and Sutter County agricultural users is approximately 1.0 maf. After these local demands are met, flows into the lower Feather River (and outside of the Project 2100 boundary) continue into the Sacramento River and into the Sacramento-San Joaquin Delta. In the northwestern portion of the Delta, water is pumped into the North Bay Aqueduct. In the south Delta, water is diverted into Clifton Court Forebay where the water is stored until it is pumped into the California Aqueduct.

1.3.1.4 Water Quality

Flows through the Delta are maintained to meet Bay-Delta water quality standards arising from DWR's water rights permits. These standards are designed to meet several water quality objectives such as salinity, Delta outflow, river flows, and export limits. The purpose of these objectives is to attain the highest reasonable water quality, considering all demands being made on the Bay-Delta waters. In particular, they protect a wide range of fish and wildlife including Chinook salmon, Delta smelt, striped bass, and the habitat of estuarine-dependent species.

1.3.2 Flood Management

The Oroville Facilities are an integral component of the flood management system for the Sacramento Valley. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (USACE). Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the release schedule in the flood control diagram or the emergency spillway

release diagram prepared by the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the USACE.

The flood control requirements are an example of multiple use of reservoir space. When flood management space is not required to accomplish flood management objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (point at which specific flood release would have to be made) varies from about 2.8 maf to 3.2 maf to ensure adequate space in Lake Oroville to handle flood flows. The actual encroachment demarcation is based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry. When the wetness index is high in the basin (i.e., high potential runoff from the watershed above Lake Oroville), required flood management space is at its greatest to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season. During flood events, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

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2.0 NEED FOR STUDY

DWR is currently in the process of renewing its license for the Oroville Facilities. FERC is responsible for granting the license and requires the applicant, DWR, to assess various resources, including recreation and socioeconomic resources. This study complies with FERC direction for preparing socioeconomic exhibits. Specifically, FERC guidelines indicate that "estimates should be provided for changes in employment and income associated with any anticipated modifications to recreation use in the Study Area, such as whitewater rafting, boating, or fishing." Because this study focuses on local economic impacts of recreation activity at the Oroville Facilities, the study also will help DWR meet FERC's direction regarding preparation of a comprehensive recreation plan.

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3.0 STUDY OBJECTIVE(S)

Local economic impacts primarily result from spending associated with recreational use of the Oroville Facilities and from spending by government agencies responsible for O&M of these facilities. As recreation activity levels vary in response to water conditions and other factors, spending by local residents and visitors to the region also change. These spending levels affect local business sales, which in turn affect employment opportunities and earnings.

The primary objective of this economic impacts study is to estimate the effects of spending activity generated by current and projected recreation use, and the O&M of the Oroville Facilities on local business sales, employment, and personal income. The study quantifies recreation-related spending and spending by key operations and management agencies (i.e., DWR, California Department of Parks and Recreation [DPR], and California Department of Fish and Game [DFG]) and assesses the associated impacts on local business sales, employment, and personal income within the greater Oroville area, Chico, Paradise, Gridley/Biggs, and in unincorporated Butte County related to recreation use and O&M of the Oroville Facilities.

A secondary objective of the study is to gain a better understanding of the relationship between the Oroville Facilities and economic development and growth within the region, particularly focused on the greater Oroville area. This objective was addressed in three background reports prepared as part of the study, including a *Phase 1 Background Report on Economic and Fiscal Conditions* in the study area, and two *Phase 2 Background Reports* that describe results from evaluating the recreation and tourism economy in Oroville and from analyzing property values in the study area using a hedonic property-pricing model. The understanding gained from these background reports provides a framework for evaluating effective recreation development strategies for potentially enhancing local economic conditions, including opportunities for public/private partnerships.

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4.0 METHODOLOGY

4.1 GENERAL APPROACH

To estimate the effects of spending generated by current and projected recreation use and by current O&M of the Oroville Facilities, community-level economic impact assessment models (hereafter referred to as community-level models) were developed for four communities in the study area: the Oroville Model Area, the Chico Model Area, the Paradise Model Area, and the Biggs-Gridley Model Area (see Figure 1.1-1). Because the community-level models include lands within the incorporated area and surrounding lands in the unincorporated area, they comprise all of the land area of Butte County.

Community-level models allow for estimating and displaying economic impacts at the sub-County level. Community impact modeling, however, requires considerable fieldwork to develop base data for each community area, thereby ensuring the accuracy of the model components.

The community-level models are based on input-output (I-O) analysis, which is a means of examining relationships within an economy, both between businesses and between businesses and final consumers. Input-output analysis captures all monetary market transactions in the local economy in a given time period. As such, the models are static and do not incorporate estimates of changing conditions, such as local population growth.

The economy is first modeled in an equilibrium (or baseline) condition, and then a change is introduced. The change disrupts the economy and causes it to adjust to changing sales, income, and employment conditions. Successive rounds of re-spending, referred to as the multiplier effect, continue to stimulate the economy until it eventually reaches a new equilibrium. The community-level models estimate the total magnitude of this change in sales, earnings, and employment. The difference between the baseline condition and the new equilibrium is the economic impact associated with a change in the local economy.

In addition to developing the community-level models, a County-level inter-community (Butte County) model was developed that links the community-level models together. The inter-community model encompasses all of the four community models and includes all of the land area in Butte County. Together, these models are used to assess the impacts of current and projected recreation use and O&M of the Oroville Facilities on local business sales, employment, and earnings.

4.2 DATA SOURCES AND MAJOR ASSUMPTIONS

4.2.1 Data Sources

Butte County Impact Analysis for Planning (IMPLAN) data for the most current available year (2000) were obtained from the Minnesota IMPLAN Group (Minnesota IMPLAN Group 2002) and used as control data for developing community model employment, earnings, and sales totals. IMPLAN is a computer-driven input-output model originally developed by the U.S. Department of Agriculture (USDA) Forest Service in cooperation with the Federal Emergency Management Agency (FEMA) and the Bureau of Land Management (BLM) to assist the Forest Service in land and resource management planning. IMPLAN data are derived from a combination of published and online data sources, including the U.S. Department of Commerce, Bureau of Labor Statistics (BLS), Bureau of Economic Analysis (BEA), U.S. Census Bureau, and the U.S. Department of Agriculture's Census of Agriculture and National Agricultural Statistical Service (NASS) websites. BLS and BEA data, found in the Regional Economic Information System (REIS), are used for employment and earnings data. These data are published in the County Business Patterns and ZIP Code Business Patterns files that are available online at the U.S. Census Bureau website. Census data are used for population and income variables at the County and sub-County levels. Because agriculture is not covered by unemployment insurance, data from the Census of Agriculture and NASS were used to develop control totals for agricultural sales, earnings, and employment.

4.2.2 Major Assumptions

The following general assumptions underlie the approach to developing the community-level models:

- Economic activity in areas other than Butte County are largely unaffected by recreation use of the Oroville Facilities.
- The future economic structure of Butte County, including the economic base, wage rates, productivity, commuting patterns, local consumption patterns, and labor markets, will be similar to the existing structure.
- Visitation patterns and recreational activities at the Oroville Facilities in the future will generally follow existing patterns.
- Future visitor spending patterns will remain similar to current patterns.

Other assumptions specific to development of individual model components are described in Section 4.3, Steps in the Model Development Process.

4.3 STEPS IN THE MODEL DEVELOPMENT PROCESS

This section describes the analytical steps followed in developing the community-level models. The Socioeconomics Technical Review Team for Oroville Facilities Relicensing reviewed these steps and the results from each step.

4.3.1 Identify Geography of Functional Economies and Establish Model Geography

Initial investigations indicated that recreation spending associated with the Oroville Facilities mostly impacts communities in proximity to the Oroville Facilities, and data from Relicensing Study R-13 – *Recreation Surveys* conducted for the relicensing process supported this hypothesis. Based on this finding and on direction from the Recreation and Socioeconomic Work Group, it was decided to focus the scope of the economic impact analysis on communities in Butte County.

Butte County is not characterized by distinct physical or political boundaries that define the economic geography of the region. The Chico-Butte area is a BEA functional economic area (FEA) and encompasses all of Butte County and portions of Glenn, Tehama, and Plumas counties. The core of this economic area is the Chico-Paradise Standard Metropolitan Area (SMA). The Chico-Paradise SMA is a strong economic center that exerts some economic dominance outside the Sacramento FEA, particularly in portions of Plumas and Tehama counties.

As shown in Figure 1.1-1, the Chico Model Area includes the Chico and Durham Census County Divisions (CCD). The Paradise Model Area includes the Paradise CCD and the Magalia CCD. The Biggs-Gridley Model Area includes the Biggs CCD and the Gridley CCD. The Oroville Model Area includes the Oroville CCD, the Palermo CCD, and the Feather Falls CCD. Figure 1.1-1 also shows the Butte County ZIP Code areas that were included in each of the community-level models.

4.3.2 Develop Community-Level Database Using Secondary Sources

To develop an initial community database, a ZIP Code data engine similar to that used to generate ZIP Code level IMPLAN data was used. The data engine assembled and unsuppressed ZIP Code data available from the U.S. Census Bureau website. Economic and demographic data for the 18 ZIP Codes in Butte County (see Figure 1.1-1) were aggregated into the four model areas (Oroville, Chico, Paradise, and Biggs-Gridley Model Areas).

A database for each of the four community models was assembled from published and on-line data sources. Secondary County-level and ZIP Code level IMPLAN data were used to construct initial databases for each of the community-level models. The databases included employment, wage and salary earnings, regional output, unearned

income, seasonal home spending, population, households, commuting patterns, income level, residency, employment status, tax rates, and savings and consumption rates.

Employment and wage and salary earnings data were derived from BEA (REIS) data. Regional output data were estimated based on County-level earnings/output ratios obtained from IMPLAN. Data on unearned income, including transfer payments and property income (dividends, interest, and rent), were obtained from the U.S. Census Bureau's American factfinder website. Data on the number of seasonal homes in the study area also were obtained from the U.S. Census Bureau website, and estimates of seasonal home spending were developed from data from large-sample studies in other states (Stynes et al. 1991). Population and household data were obtained from the U.S. Census Bureau website.

Initial commuting patterns were developed from journey-to-work data from the U.S. Census Bureau website, augmented with data from interviews with local transit providers, transportation planning officials at the Butte County Association of Governments, and staff at the California State Department of Transportation (Caltrans). Population/labor ratios were developed based on BEA employment data and U.S. Census Bureau population data. Data on the population of working and non-working families, population in the armed services, and resident population were obtained from the U.S. Census Bureau website. Taxation, savings, and consumption rates for communities in the study area were obtained from the IMPLAN database.

4.3.3 Construct Preliminary Community-Level Models and Ground-Truth Results

Preliminary community-level models for the Oroville, Chico, Paradise and Biggs-Gridley Model Areas were constructed from available secondary data sources. Employment and earnings totals in the four models were controlled to match totals obtained from IMPLAN for Butte County (Minnesota IMPLAN Group 2002). Industrial output by industry for each of the four models was derived using employment/earnings ratios obtained from IMPLAN. Estimates of exports for these models, which play an important role in explaining sources of capital and income for the local economy and in determining the multiplier or "re-spending" effect, were developed using mechanical techniques.

The following factors used in constructing the community-level models were derived from national data:

- Endogenous business investment
- Household share of investment
- Average propensity to consume
- Marginal propensity to consume
- Average propensity to save
- Average federal income tax rates
- Average state and local income tax rates
- Average state and local government propensity to consume locally

Developing the community-level models also allowed for adjusting absentee claims on profits on an industry-by-industry basis. For this study, overall profits (generated by place of work) were classified as either claimed in-community or absentee based on the size of the industry. Businesses in sectors with relatively few jobs were assumed to be locally owned and profits were assumed to remain in the community. Large industries were assumed to be owned primarily by absentee owners with profits allowed to leak out of the community.

Each of the four community-level models was constructed using a combination of spreadsheet programs along with a mathematical software program, GAUSS, that handles complex mathematical operations. Once a preliminary database and model are constructed using this software, the model can be adjusted and "rerun" with several spreadsheet macros. After a preliminary model is constructed, various worksheets in the model can be "pulled out" of the model for analyzing and displaying aspects of the local economy. These include detailed estimates of employment and earnings in each industrial sector of the economy (with up to 528 sectors shown). Export base analysis is integrated in the preliminary model, which displays what percent of total export income is derived from each sector of the economy.

The secondary data used to construct the community-level models were then ground-truthed by conducting extensive fieldwork to ensure that the data were generally acknowledged as accurate by community representatives. The detailed worksheets that comprise a model include information that was reviewed with local officials to determine whether the model accurately depicts the community's economy. These worksheets are included in Appendix A.

4.3.4 Collect Primary Data for Key Economic Sectors and Revise Community-Level Model Databases

Because of the importance of recreation and tourism in this study, data for recreation and tourism-related sectors were carefully examined, and primary data were collected through interviews and surveys of local businesses to revise the databases. For example, all sales in the motel sector in the preliminary community-level model for the Oroville Model Area were shown as being absorbed by the local economy, leaving no motel sales for tourism.

In the Oroville Model Area, particular emphasis was placed on recreation and tourist-serving businesses. Businesses in each of the following ten sectors were surveyed to obtain better employment and export sales data:

- Motels and lodging places;
- Amusement and recreation services – casinos;
- Amusement and recreation services – guides and outfitters;

- Amusement and recreation services – guides and outfitters located outside of study area but who advertise guiding either at Lake Oroville or the Feather River;
- Eating and drinking establishments;
- Food and convenience stores;
- Sporting goods stores;
- Boat storage and repair businesses; and
- Antique, gift stores, and related establishments.

Because visitor-spending impacts were expected also to occur in other local communities, a sample of businesses in Paradise and motels and restaurants in Gridley was surveyed to obtain employment and export sales data.

Primary data also were collected on employment and exports for large employers and industries that were significant components of the economic base. The Chambers of Commerce for Oroville, Gridley, Chico, and Paradise were contacted to obtain information on large employers in their respective areas. Manufacturing is a major component of the export base in Butte County, and major employers throughout the County were contacted. Government employers also were surveyed to update employment data. Generally, government employment reported by secondary sources was found to be accurate. Secondary data on major employers also were reviewed with staff at the Chambers of Commerce and at city governments.

Adjustments to the initial databases for each community-level model were then made using the "selective precision" approach described by Jensen (1980). In general, data and relationships for sectors that play an important role in the local economy and that are a key component of the economic base were adjusted with field data as appropriate. Adjustments also included deleting industrial sectors that are no longer present in the local economy (because of inherent lags in reporting changes in economic activity) and adjusting levels of employment to reflect recent changes in an industrial sector. Employment and earnings totals were adjusted to reflect field data, and regional output was adjusted using employment/output ratios.

4.3.5 Modify Export Base in Key Economic Sectors

Economic base analysis was initially used to determine the proportion of output (or sales) of each sector of the local economy that is exported. Analysis of the economic base of an area identifies the industries that bring money into the region, which are critical to the economic growth and sustainability of a region. For example, most of the output of the wood products industry in Oroville is sales to customers outside the Oroville area (i.e., export sales), and closure of the Louisiana-Pacific Mill in Oroville in

1998 removed a significant share of the area's export sales. In contrast, although resident-serving industries such as retail stores enhance the local multiplier effect by generating more re-spending of money, these types of businesses often do not bring new money into an area because they sell goods or services primarily to residents of the area. The loss of these types of businesses increases leakage of local trade to other areas but does not affect the economic base of an area.

The amount of exports in the preliminary community-level models was estimated based on mechanical techniques including supply-demand pool analysis, location quotient analysis, and use of regional purchase coefficients. Supply-demand pool analysis evaluates whether local production of goods and services meets local demand, as indicated by national input-output technical coefficients; if the local supply falls short of demand, then the deficiency is assumed to be imported into the region. Location-quotient analysis compares the ratio of output of an industry in the local economy to output of the same industry in a reference economy (e.g., national economy). Regional purchase coefficients utilize econometrics to calculate what portion of a region's supply is purchased locally. Economic studies of other communities have shown that these mechanical techniques tend to overstate the re-spending in the local economy (Richardson 1972; Leontief 1986); consequently, the lower estimates of spending in the local economy derived by supply-demand pool analysis and location-quotient analysis were used as a default value.

Use of mechanical techniques typically results in local absorption of the output of a variety of local industries that export all of their output (i.e., an extreme case of underestimating exports). Most of these industries, however, are typically in "background sectors," which are sectors that do not play a significant role in this type of analysis. Because these sectors do not have a significant role in the analysis, changes to exports in these sectors by overriding the data are not critical .

The estimates of exports using the mechanical techniques were then adjusted based on survey data obtained from interviews within the region. The adjustments made to the community models for each area are described below.

Oroville Community Model

For this study, most of the direct spending by visitors and O&M expenditures occurs in the Oroville Model Area, so export data in the Oroville community model were scrutinized more thoroughly than the data in the other community models. Direct expenditures by visitors occur mostly in the recreation and tourism-related sectors, including lodging, miscellaneous retail, amusement and recreation services, food stores, and eating and drinking establishments, so these sectors were carefully examined.

The mechanical export estimates for miscellaneous retail (12 percent) and amusement and recreation services (84 percent) were comparable to data collected through interviews and were not adjusted. Based on interview data collected, export sales for other tourism-linked sectors were adjusted as follows: food stores, adjusted from 55

percent to 13 percent; eating and drinking establishments, adjusted from 0 percent to 10 percent; and hotels and lodging places, adjusted from 0 percent to 53 percent.

Export sales for construction sectors also were adjusted based on data collected through interviews. The sectors that were adjusted include dimension stone, sand and gravel, new construction and maintenance, and repair construction. In all of these sectors except for sand and gravel, the export percent was adjusted downward. Although the construction industry in the Oroville area is not a strong exporter of construction services, the Oroville area is a significant supplier of sand and gravel so this export percent was increased.

Export sales for some of the manufacturing sectors in the Oroville community model also were adjusted. The most significant adjustment was in the miscellaneous plastics and printed circuit boards sectors and was based on interview data collected. Mechanical techniques showed significant local absorption in these sectors, whereas interview data indicated that all of the production in these sectors was exported. Export sales in the wood products and metal manufacturing sectors also were adjusted to conform to interview data, which indicated that all of the production is exported from the Oroville area. Although adjustments were made in these manufacturing sectors, they are considered background sectors in the analysis.

Paradise Community Model

Paradise is characterized by a residence-serving economy with a weak export base. The most significant components of the export base in Paradise are a commercial printing operation and the local hospital.

Mechanical estimates of exports for the commercial printing sector (46 percent), which sells to a large geographic area, seemed reasonable and were not adjusted. Similarly, mechanical estimates of exports for the hospital sector (15 percent), which is dominated by a hospital affiliated with the Adventist Church that provides specialized medical care and serves patients from throughout the region, were consistent with interview data and were not adjusted.

Several adjustments were made to the construction sectors in Paradise. Model data showed large exports from new construction (82 percent) and maintenance and repair construction (80 percent) from Paradise. These export sales were adjusted to 5 percent for both sectors. Although the Paradise area does export some construction services to neighboring Plumas County, the industry does not export a significant amount of construction to either the Chico or Oroville areas.

Several adjustments also were made in the tourist-related sectors. Mechanical estimates of exports of food store sales (84 percent) were considered suspect because of the high proportion of retirees in the area who typically spend a large proportion of their income on food purchases. This finding also was reflected in a relatively high percent of exports for eating and drinking establishments. Exports for both of these

sectors were adjusted downward. Mechanical techniques showed the motel sector with no exports so export sales for this sector were adjusted upwards based on interview data.

Lastly, export sales in the wood products sector in the Paradise Model Area, which includes logging and sawmill operations, were adjusted upwards to reflect more exports from the area.

Chico Community Model

The Chico area has the strongest and most diverse economic base of the Butte County community areas. The manufacturing sector is an important export sector in the Chico Model Area and mechanical estimates of exports showed the local economy absorbing between 10 and 20 percent of the output of the industries in this sector. Based on interview data, the output of most of these industries is believed to be exported. However, because the manufacturing sector plays only a small role in the analysis, mechanical estimates of export sales for industries in this sector were not adjusted.

One potentially important sector in the Chico area is the construction sector because construction services may be needed in Oroville for construction of new recreation facilities, such as a marina. Mechanical estimates of exports for the construction industry (new and maintenance construction) were considered high (79 percent and 76 percent, respectively), so export sales in both sectors were adjusted to allow for 25 percent exports. Export sales for ready-mix concrete and concrete products also were unreasonably high and were adjusted downwards.

Mechanical estimates of exports in the tourism-related sectors (food stores, miscellaneous retail, eating and drinking establishments, motels and lodging places, and amusement and recreation services) were consistent with interview data for most sectors. The notable exception was eating and drinking establishments, which showed 52 percent exports in the Chico community model. Export sales in this sector were adjusted downwards to allow 20 percent exports to account for sales to visitors.

Biggs-Gridley Community Model

Mechanical estimates of exports for tourism-related sectors in the Biggs-Gridley community model were examined based on data collected through interviews. The only adjustment to export sales was in the hotel and lodging sector (from 0 percent to 25 percent) to allow for capturing some tourism and use of local motels by family members visiting relatives in the area. Interviews with local motel owners indicated that this was an important part of their business.

4.3.6 Conduct Sensitivity Analyses and Revise the Community-Level Models

Preliminary runs of the models using a wide range of input variables were undertaken to determine whether the model's projections of impacts were reasonable. This procedure

focused on the recreation and tourism, construction, and State government sectors because these sectors were expected to be impacted significantly in model simulations.

Multipliers for each of the four community-level models were analyzed and compared, both to each other and to an "off-the-shelf" IMPLAN model that was built for Butte County. Table 4.3-1 includes the Type 1 output multipliers from the community-level model for Oroville that were compared with the Type I multipliers for the IMPLAN Butte County Model. The Oroville multipliers are smaller because the economy of Oroville is more open, with more trade leakage than that of Butte County.

One significant difference in the two sets of multipliers is in the State and local government sector. It is somewhat misleading to compare the multiplier for the Oroville Model Area to the IMPLAN multiplier for Butte County because the Oroville Model Area includes a multiplier for State government and a separate multiplier for local government. In our experience, local government tends to spend more in the local economy and has a higher multiplier. Fieldwork also confirmed that State agencies in Oroville do not spend a large proportion of their budget in the local area.

Multipliers for the Chico, Paradise, and Biggs-Gridley Model Areas also were compared to multipliers for Butte County from the IMPLAN model. Results of these comparisons indicated that the multipliers in all community-level models developed for the study were reasonable.

We then made final changes in export sales in key sectors of each of the community-level models, except for in the Oroville Model Area where results were already consistent with expectations. Most of these changes increased local exports and reduced the local multiplier effect. Export sales in the community-level model for the Biggs-Gridley Model Area were adjusted to allow for more out-of-area consumption in the motel sector and to increase exports for the manufacturing sector. This economy is relatively open, with considerable trade leakage and very little capture of trade from surrounding areas. Interviews with local manufacturers indicated that they export all of their production. Exports sales by retail and other sectors that sell primarily to consumers (final demand) were adjusted to absorb most of the local production. For example, exports by medical offices, nursing, and hospitals were adjusted so that local sales constitute all but 10 percent of total sales. Fieldwork indicated that medical services in Gridley and Biggs primarily serve the local community.

4.3.7 Develop Intercommunity Linkages

In addition to constructing individual community-level models, an inter-community model was constructed to assess how a change in one community affects economic activity in the other communities. Both direct and indirect effects of inter-community economic activity are included in this model.

Table 4.3-1. Comparison of select Type I output multipliers from the community-level Oroville model and the IMPLAN Butte County model.

Industrial Sector	Butte County IMPLAN	Oroville Model
New construction	1.716502	1.3556739
Maintenance and repair construction	1.650645	1.3643764
Wholesale trade	1.549578	1.2540032
Building materials and gardening	1.632426	1.2481324
Food stores	1.618201	1.2585049
Automotive dealers and service stations	1.632215	1.2614648
Eating and drinking	1.580948	1.2614648
Miscellaneous retail	1.650191	1.2671388
Real estate	1.432709	1.2178095
Hotels and lodging places	1.654074	1.3079311
Automobile rental and leasing	1.757175	1.2847631
Automobile parking and car wash	1.714802	1.295205
Automobile repair and services	1.593004	1.2476584
Miscellaneous repair shops	1.523014	1.2081711
Amusement and recreation services	1.688015	1.3232864
State and local government	1.812634	1.5099182

Source: Study results and IMPLAN data for Butte County.

The four community-level models were linked via their technical coefficients matrices (A-matrix) to reflect inter-community trade patterns. (Appendix A describes this linkage in detail; Appendix C includes the employment and earnings multipliers and economic impact factors by model area.) Because Chico dominates trade in the region, the inter-community model reflects strong linkages between each of the other three community areas and Chico. The inter-community model was developed based on the assumption that local industries would trade with industries in the region, particularly in Chico, if goods were available locally. For example, local rice producers are assumed to trade or sell their rice production to the milling facility in Biggs until the Biggs facility meets all of its requirements. Any excess rice is assumed to be exported. Similarly, the model assumes that industries in Chico would absorb local production before they import goods from outside the region. For example, the inter-community model assumes that an almond processing facility in Chico purchases almonds available locally before it imports almonds from outside the County.

An important component of the inter-community model is commuting patterns. A commuting matrix was incorporated into the model to allocate consumption to the appropriate community-level model. This feature assumes that existing commuting patterns are a valid basis for allocating any new jobs created by economic activity. With the inter-community model, when new jobs are created in Oroville or any of the other communities, some of these jobs are captured by residents of the three surrounding Butte County community areas. The wage and salary earnings associated with in-commuting are then allocated to consumption in each of the other communities. For example, if 100 new jobs are created in Oroville, Chico residents may fill ten of these

jobs. If these jobs pay $25,000 per year, the Chico economy effectively captures $250,000 in household consumption that would otherwise be assigned to Oroville.

4.4 DEVELOPMENT OF DIRECT INPUTS TO THE ECONOMIC IMPACT ASSESSMENT MODELS

The following information describes current and projected visitor spending and O&M expenditures used as input to the model areas for the analysis.

4.4.1 Recreation-Related Spending

Data on spending by visitors to the Oroville Facilities were collected in follow-up mail surveys to the on-site recreation surveys conducted for Oroville relicensing. This data collection approach allowed for obtaining comprehensive and potentially more accurate data without compromising the response and completion rates for the on-site recreation surveys.

At the conclusion of the on-site recreation surveys, interviewees were asked if they would participate in a follow-up survey by mail to provide some additional information about the costs associated with their trip. The interviewer explained the importance of this information to the study to encourage their participation. The interviewer asked for the person's name and mailing address to send the follow-up mail survey to the interviewee after his/her trip was completed. The response rate for the mail-back survey was about 40 percent (i.e., 40% of persons agreeing to participate in the mail-back survey sent back the survey).

The interviewer provided the interviewee with a complimentary map of the Oroville Facilities, downstream reaches, and surrounding area. The reverse side of the map identified the types of spending information that would be requested in the follow-up mail survey. Spending information included the amount of spending made by the respondent for goods and services in different types of establishments and in different locations within the study area (Butte County and five community areas). The total spending for the trip, including spending outside the study area, also was asked. (Refer to the survey form in the study report for the Relicensing Study R-13 – *Recreation Surveys*.)

The spending information collected from these follow-up surveys was processed in conjunction with the data collected from the on-site surveys to develop spending profiles by visitors to the different recreation areas at the Oroville Facilities. These profiles include estimates of per-day spending by recreation area visited and for local (residents of a particular model area), nonlocal (residents of Butte County but who live outside a model area of interest), and out-of-County visitors. Spending profiles by activity also were estimated, but this level of specificity is not needed for simulating the community-level models and therefore is not reported here. In addition to trip-related spending, information on annual expenditures on durable items was collected as part of the follow-

up mail survey; this information also is not used for simulating the community-level models.

Estimates of average spending per visitor day for recreation at the Oroville Facilities by local residents (i.e., live within the model area of interest), nonlocal residents of Butte County (i.e., live outside the model area of interest but within Butte County), and nonresidents of Butte County are shown in Table 4.4-1. More detailed spending profiles used in the economic impact assessment and descriptive statistics showing the range and standard deviation of the visitor spending data are included in Appendix B. The profiles in Appendix B show spending by area of residency, recreation site visited, and model area where the spending occurred. These data are used with estimates of the number of visitor days derived from recreation days reported in the Relicensing Study R-9 – *Existing Recreation Use* and Relicensing Study R-13 – *Projected Recreation Use* to estimate visitor spending by model area.

Table 4.4-1. Average per-day spending for recreation at the Oroville Facilities by local residents, nonlocal residents, and nonresidents of Butte County.

Model Area	Local Residents	Nonlocal Residents	Nonresidents of Butte County
Oroville	$32.95	$6.85	$18.40
Paradise	$37.74	$0.48	$1.17
Biggs-Gridley	$19.62	$0.08	$0.93
Chico	$27.80	$0.77	$0.71

Source: Derived from data collected as part of Relicensing Study R-13 – Recreation Surveys.

4.4.2 Operations and Maintenance Expenditures

Operation and maintenance of the Oroville Facilities is an important component of the Project's effects on the local area. Estimates of annual expenditures made by DWR, DPR, and DFG associated with O&M of the Oroville Facilities are shown in Table 4.4-2.

The estimates of total expenditures by agency shown in Table 4.4-2 are annual averages derived from budget data between Fiscal Year 1995-96 and 2003-04 provided by the State agencies. It should be noted that expenditures, particularly non-payroll expenditures, vary from year to year depending on a number of factors. The allocation of the total agency expenditures to the model areas is based on data obtained from DWR, DPR, and DFG concerning the residency of its employees and on estimates of the percentage of non-payroll expenses that are made within Butte County. Payroll expenditures are the largest component of direct State expenditures associated with the Oroville Facilities.

Table 4.4-2. Estimates of annual operations and maintenance expenditures by State agencies related to the Oroville Facilities.

Area	DWR		DPR	DFG	TOTAL
	Recreation-Related	Other			
Paradise	$806,600	$119,500	$145,600	$71,600	$1,141,200
Oroville	$6,965,700	$1,030,300	$1,529,500	$289,500	$9,805,900
Chico	$493,500	$73,000	$84,900	$60,400	$713,600
Biggs-Gridley	$347,700	$51,400	$12,100	$214,000	$630,000
Out-of-County	$2,602,300	$384,900	$12,100	$131,500	$3,136,500
TOTAL	$11,216,800	$1,659,100	$1,784,200	$767,000	$15,427,200

Note: The costs of operating the Feather River Fish Hatchery, which are estimated at about $1.3 million annually, are included in "other" DWR expenditures. These other expenditures also include costs related to power generation and water supply from the Oroville Facilities. Estimates of wage and salary earnings were allocated to the model areas and out-of-County based on information on the residency of employees obtained from the State agencies. The residency of employees at DWR's Oroville Field Division is as follows: Oroville, 72 percent; Paradise, 12 percent; Chico, 7 percent; Biggs-Gridley, 5 percent; and out-of-County, 4 percent. The residency of local DPR employees is as follows: Oroville, 79 percent; Paradise, 12 percent; Chico, 7 percent; Biggs-Gridley, 1 percent; and out-of-County, 1 percent. The residency of local DFG employees is as follows: Oroville, 8 percent; Paradise, 14 percent; Chico, 12 percent; Biggs-Gridley, 41 percent; and out-of-County, 25 percent. Wages and salaries account for about 61 percent of DWR's operating budget for the Oroville Facilities. Non-labor expenditures by the State agencies were assigned to the Oroville Model Area.

Source: Derived from historical data compiled from the State agencies. Data for deriving estimates for DPR and DFG are presented in the Phase 1 Background Report for Study Plans R-18 and R-19. Data for DWR were obtained from Shelly Byrne at DWR's Oroville Field Division.

4.5 LIMITATIONS OF THE ECONOMIC IMPACT ASSESSMENT MODELS

Two types of limitations affect the economic impact assessment models, both the community-level models and the inter-community model. The first type of limitation is related to assumptions inherent in the structure of the models. Input-output models are static equilibrium models that capture the structure of the economy in a static baseline state and then introduce changes in final demand. In reality, the economic structure of a region is dynamic; consequently, input-output models typically have a "shelf life," after which they become outdated to some extent. As key economic relationships in the study area change, the model gradually loses accuracy. However, other studies have shown that the input structure of industries, which is key to model development, is relatively stable over time (Richardson 1972; Miller1985).

The second type of limitation relates to the data used to simulate the models. The economic impact assessment models require estimates of recreation visitation that are derived from survey and other data. These data, in turn, are multiplied by visitor spending profiles developed from recent surveys. As identified in the Section 4.2.2, Major Assumptions, the estimates of future recreation visitation depend in large part on the assumption that future visitor spending patterns will remain similar to current patterns. This assumption may prove incorrect if major shifts in recreation preferences and associated spending patterns occur.

5.0 STUDY RESULTS AND DISCUSSION

Conceptually, local and regional economic activity generated by use of recreation facilities can be traced from the provision of recreation facilities to the generation of employment and income opportunities within a region. Recreation facility development and management of recreation resources affects the amount and type of visitation attracted to a recreation area. Changes in facilities and facility management result in changes in visitation, which, in turn, alter the location and level of spending by visitors to these facilities. For example, a highly developed recreation area, such as one including a resort with restaurants, boat slips, and boat launching facilities, may attract large numbers of visitors from outside the region who spend money on accommodations, restaurant meals, boat rentals, and fuel in the vicinity of the recreation area. Alternatively, an undeveloped campground may attract relatively few visitors from outside the local area, resulting in spending that largely consists of food and gasoline purchases made at home or en route to the site.

The economic effects of two recreation-use conditions, including current levels of recreation use and projected future (2020) levels of recreation use of the Oroville Facilities, were evaluated using the economic impact assessment models. In addition, the economic effects of current O&M expenditures for the Oroville Facilities were evaluated. The results of these analyses are described below.

5.1 ECONOMIC EFFECTS OF CURRENT RECREATION ACTIVITY AND O&M EXPENDITURES

Economic effects of current conditions were estimated based on current (FY 2002-03) levels of visitation to the Oroville Facilities and on current levels of O&M expenditures at the Oroville Facilities. The economic effects within each of the four model areas and Countywide are described in the following sections.

5.1.1 Oroville Model Area

5.1.1.1 Recreation Activity-Related Effects

Spending

Current annual spending in the Oroville Model Area associated with recreation activity at the Oroville Facilities is estimated to total $20.4 million, accounting for 67 percent of total spending in Butte County associated with visitation to the Oroville Facilities (Table 5.1-1). An estimated 41 percent of the expenditures is made by residents of the model area, 9 percent is made by nonlocal visitors (i.e., those residing within Butte County but outside of the model area), and 50 percent is made by out-of-County visitors (i.e., those residing outside of Butte County).

Of the total recreation activity-related spending in the model area, 63 percent is made at service stations, food stores, and miscellaneous retail businesses. Among nonlocal visitors, 54 percent of spending is at service stations and food stores. For out-of-County

Table 5.1-1. Estimated recreation-related spending generated by existing visitation to the Oroville Facilities.

Type of Spending/Model Sector	Oroville Model Area ($1,000)	Paradise Model Area ($1,000)	Biggs-Gridley Model Area ($1,000)	Chico Model Area ($1,000)	Butte County Total ($1,000)
Spending by Local Residents:					
Food stores	$2,146.6	$843.7	$199.2	$792.4	$3,981.9
Automotive dealers and service stations	$1,745.0	$1,093.2	$229.2	$909.0	$3,976.4
Apparel and accessory stores	$307.3	$26.6	$41.0	$198.4	$573.3
Eating and drinking places	$434.5	$68.0	$41.1	$9.0	$552.6
Miscellaneous retail	$1,977.4	$460.4	$120.5	$703.3	$3,261.6
Hotels and lodging places	$78.1	$0.0	$0.0	$3.3	$81.4
Amusement and recreation services	$211.7	$252.6	$1.7	$75.5	$541.5
State government	$1,003.3	$656.0	$74.3	$227.9	$1,961.5
Other	$478.5	$567.8	$13.2	$330.6	$1,390.1
Subtotal	$8,382.4	$3,968.4	$720.1	$3,249.3	$16,320.2
Spending by Nonlocal Visitors:					
Food stores	$311.5	$65.1	$13.4	$188.0	$578.0
Automotive dealers and service stations	$651.5	$74.2	$3.6	$31.2	$760.5
Apparel and accessory stores	$24.3	$6.1	$5.9	$5.2	$41.5
Eating and drinking places	$198.0	$4.6	$0.0	$18.2	$220.8
Miscellaneous retail	$185.6	$19.3	$5.9	$181.9	$392.7
Hotels and lodging places	$38.6	$0.0	$0.0	$0.0	$38.6
Amusement and recreation services	$77.0	$10.6	$0.0	$0.0	$87.6
State government	$88.8	$12.5	$0.0	$0.5	$101.8
Other	$206.1	$22.0	$13.1	$0.0	$241.2
Subtotal	$1,781.4	$214.3	$41.8	$425.0	$2,462.5
Spending by Out-of-County Visitors:					
Food stores	$2,058.2	$188.5	$109.5	$15.3	$2,371.5
Automotive dealers and service stations	$2,338.0	$117.7	$129.1	$81.5	$2,666.3
Apparel and accessory stores	$180.7	$3.4	$3.0	$41.0	$228.1
Eating and drinking places	$1,415.1	$38.6	$251.2	$132.1	$1,837.0
Miscellaneous retail	$1,486.5	$120.0	$27.6	$50.4	$1,684.5
Hotels and lodging places	$878.9	$105.2	$61.7	$28.8	$1,074.6
Amusement and recreation services	$1,438.4	$41.6	$5.3	$12.6	$1,497.9
State government	$259.1	$3.2	$9.6	$10.3	$282.2
Other	$211.1	$16.1	$0.0	$20.4	$247.6
Subtotal	$10,265.9	$634.2	$597.0	$392.4	$11,889.5
Total Recreation-Related Spending:					
Food stores	$4,516.3	$1,097.3	$322.1	$995.6	$6,931.3
Automotive dealers and service stations	$4,734.5	$1,285.2	$361.9	$1,021.7	$7,403.3
Apparel and accessory stores	$512.3	$36.1	$49.8	$244.5	$842.7
Eating and drinking places	$2,047.6	$111.2	$292.3	$159.3	$2,610.4
Miscellaneous retail	$3,649.5	$599.7	$154.0	$935.5	$5,338.7
Hotels and lodging places	$995.6	$105.2	$61.7	$32.1	$1.194.6
Amusement and recreation services	$1,727.0	$304.8	$7.0	$88.1	$2,126.9
State government	$1,351.2	$671.7	$83.8	$238.7	$2,345.4
Other	$895.6	$605.9	$26.3	$351.0	$1,878.8
Total	$20,429.7	$4,817.0	$1,358.9	$4,066.6	$30,672.2

Note: Columns and rows may not sum to totals due to independent rounding of spending for individual sectors and model areas.

Source: Results from the economic impact assessment models of using estimates of existing spending levels.

visitors, spending at service stations, food stores, miscellaneous retail businesses, and eating and drinking places account for 71 percent of total spending.

Jobs

Current spending in the Oroville Model Area associated with recreation activity at the Oroville Facilities by persons who do not reside in the model area (i.e., out-of-area visitors) generates an estimated 453 jobs in the Oroville Model Area, accounting for 68 percent of the total number of jobs generated by out-of-area visitor spending in Butte County (Table 5.1-2). (Note: Recreation-related spending by residents of the Oroville Model Area does support jobs locally but the analysis assumes that these jobs or comparable jobs would be supported by local spending even if recreation activity at the Oroville Facilities was not occurring.) Spending by out-of-County visitors generates 391, or 86 percent, of the total jobs generated by out-of-area visitors to the Oroville Model Area. Of the estimated 453 jobs created in the Oroville Model Area, 216 are in the trade sector and 125 are in the motels, eating and drinking places, and amusement and recreation services sectors.

Earnings

Earnings associated with jobs created by out-of-area visitor spending are estimated to total about $8.6 million in the Oroville Model Area. Similar to employment effects, earnings effects are estimated to be concentrated in the trade and the motels, eating and drinking places, and amusement and recreation services sectors, with 68 percent of the earnings concentrated in these sectors (Table 5.1-3). Earnings in the government sector, accounting for 19 percent of total earnings, also are relatively large.

5.1.1.2 Facilities Operations and Maintenance Effects

Jobs

Current expenditures made by State agencies for O&M of the Oroville Facilities generate an estimated 319 jobs in the Oroville Model Area (Table 5.1-4). Reflecting the role of the State government in managing the Oroville Facilities, most of which are located in the Oroville Model Area, most of these jobs (241) are in the government sector. O&M expenditures indirectly generate jobs in other sectors of the model area's economy, including an estimated 27 jobs in the medical, education, and social services sector and 19 jobs in the trade sector.

Earnings

Earnings in the Oroville Model Area generated by current O&M expenditures total an estimated $10.6 million, with the government sector benefiting from 87 percent of these earnings (Table 5.1-5). Of the remaining earnings, about 9 percent is concentrated in the trade sector, the medical, education, and social services sector, and the consumer and business services sector.

Table 5.1-2. Estimated jobs generated by existing non-local and out-of-County visitor spending.

Type of Visitor/Model Sector	Oroville Model Area	Paradise Model Area	Biggs-Gridley Model Area	Chico Model Area	Butte County Total
Nonlocal Visitor Effects:					
Agriculture, mining, sand, and gravel	0	0	0	0	1
Construction	0	0	0	2	2
Manufacturing	0	0	0	1	1
Transportation, public utilities, publishing, and communications	1	0	0	2	3
Trade	32	4	1	15	52
Finance, insurance, & real estate	1	0	0	2	3
Motels, eating/drinking, and amusement/recreation	11	1	0	4	16
Consumer and business services	5	1	0	6	12
Medical/education/social services	4	1	0	3	8
Local, State, and Federal government	8	1	0	1	10
Subtotal	62	8	1	36	107
Out-of-County Visitor Effects:					
Agriculture, mining, sand, and gravel	3	0	0	2	5
Construction	0	0	0	9	9
Manufacturing	1	0	0	4	5
Transportation, public utilities, publishing, and communications	5	0	0	8	13
Trade	184	13	7	20	224
Finance, insurance, & real estate	4	1	0	7	12
Motels, eating/drinking, and amusement/recreation	114	8	12	19	153
Consumer and business services	15	2	0	27	44
Medical/education/social services	23	3	1	14	41
Local, State, and Federal government	42	2	1	4	49
Subtotal	391	29	21	114	555
Total Visitor Effects:					
Agriculture, mining, sand, and gravel	3	0	0	2	6
Construction	0	0	0	11	11
Manufacturing	1	0	0	5	6
Transportation, public utilities, publishing, and communications	6	0	0	10	16
Trade	216	17	8	35	276
Finance, insurance, & real estate	5	1	0	9	15
Motels, eating/drinking, and amusement/recreation	125	9	12	23	169
Consumer and business services	20	3	0	33	56
Medical/education/social services	27	3	1	17	48
Local, State, and Federal government	50	3	1	5	59
Total	453	37	22	150	662

Source: Results from simulating the economic impact assessment models using estimates of existing non-local and out-of-County visitor spending levels.

Table 5.1-3. Estimated earnings generated by existing non-local and out-of-County visitor spending.

Type of Visitor/Model Sector	Oroville Model Area ($1,000)	Paradise Model Area ($1,000)	Biggs-Gridley Model Area ($1,000)	Chico Model Area ($1,000)	Butte County Total ($1,000)
Nonlocal Visitor Effects:					
Agriculture, mining, sand, and gravel	$6.1	$1.1	$0.2	$5.8	$13.3
Construction	$1.2	$1.5	$0.1	$42.6	$45.4
Manufacturing	$2.9	$0.1	$0.0	$21.7	$24.8
Transportation, public utilities, and communications	$20.4	$1.8	$0.1	$49.9	$72.5
Trade	$636.0	$94.6	$16.5	$289.4	$1,036.5
Finance, insurance, & real estate	$18.4	$4.6	$0.3	$36.1	$59.4
Motels, eating/drinking, and amusement/recreation	$145.7	$9.9	$0.5	$36.2	$192.4
Consumer and business services	$110.2	$14.6	$4.6	$110.5	$239.9
Medical/education/social services	$55.5	$19.3	$2.3	$81.8	$159.0
Local, State, and Federal government	$278.0	$28.2	$0.3	$38.7	$345.3
Subtotal	$1,274.5	$175.8	$25.4	$712.8	$2,188.5
Out-of-County Visitor Effects:					
Agriculture, mining, sand, and gravel	$37.9	$4.2	$2.8	$26.7	$71.5
Construction	$7.1	$5.0	$0.9	$207.6	$220.7
Manufacturing	$16.9	$0.5	$0.5	$111.5	$129.3
Transportation, public utilities, publishing, and communications	$127.2	$6.3	$6.6	$236.6	$376.7
Trade	$3,410.2	$264.2	$157.1	$409.0	$4,231.5
Finance, insurance, & real estate	$106.4	$16.7	$3.5	$171.8	$298.4
Motels, eating/drinking, and amusement/recreation	$1,635.4	$88.6	$129.1	$191.4	$2,044.4
Consumer and business services	$280.9	$28.2	$6.0	$551.4	$866.5
Medical/education/social services	$316.7	$71.3	$21.6	$364.6	$774.1
Local, State, and Federal government	$1,394.3	$64.8	$10.9	$161.2	$1,631.3
Subtotal	$7,323.8	$549.9	$339.0	$2,431.8	$10,644.5
Total Visitor Effects:					
Agriculture, mining, sand, and gravel	$44.0	$5.3	$3.0	$32.5	$84.8
Construction	$8.3	$6.5	$1.0	$250.2	$266.1
Manufacturing	$19.8	$0.6	$0.5	$133.2	$154.1
Transportation, public utilities, publishing, and communications	$147.6	$8.1	$6.7	$285.9	$449.2
Trade	$4,046.2	$358.8	$173.6	$698.4	$5,268.0
Finance, insurance, & real estate	$124.8	$21.3	$3.8	$207.9	$357.8
Motels, eating/drinking, and amusement/recreation	$1,781.1	$98.5	$129.6	$227.6	$2,236.8
Consumer and business services	$391.1	$42.8	$10.6	$661.9	$1,106.4
Medical/education/social services	$372.2	$90.6	$23.9	$446.4	$933.1
Local, State, and Federal government	$1,672.3	$93.0	$11.2	$199.9	$1,976.6
Total	$8,598.3	$725.7	$364.4	$3,144.6	$12,833.0

Note: Columns and rows may not sum to totals due to independent rounding of earnings for individual sectors and modeling areas.
Source: Results from simulating the economic impact assessment models using estimates of existing non-local and out-of-County visitor spending levels.

Table 5.1-4. Estimated jobs generated by existing operations and maintenance expenditures at the Oroville Facilities.

Model Sector	Oroville Model Area	Paradise Model Area	Biggs-Gridley Model Area	Chico Model Area	Butte County Total
Agriculture, mining, sand, and gravel	3	0	0	2	5
Construction	1	1	0	13	15
Manufacturing	1	0	0	4	5
Transportation, public utilities, publishing, and communications	3	0	0	6	9
Trade	19	3	1	18	41
Finance, insurance, & real estate	3	1	0	7	11
Motels, eating/drinking, and amusement/recreation	12	2	1	14	29
Consumer and business services	9	2	0	24	35
Medical/education/social services	27	5	1	18	51
Local, State, and Federal government	241	23	14	19	297
TOTAL	319	37	17	125	498

Source: Results from simulating the economic impact assessment models using estimates of existing operations and maintenance spending levels.

Table 5.1-5. Estimated earnings generated by existing operations and maintenance expenditures at the Oroville Facilities.

Model Sector	Oroville Model Area ($1,000)	Paradise Model Area ($1,000)	Biggs-Gridley Model Area ($1,000)	Chico Model Area ($1,000)	Butte County Total ($1,000)
Agriculture, mining, sand, and gravel	$40.3	$6.5	$2.7	$31.9	$81.4
Construction	$14.1	$13.0	$2.0	$290.0	$319.1
Manufacturing	$15.5	$0.9	$0.7	$118.6	$135.7
Transportation, public utilities, publishing, and communications	$91.8	$9.5	$6.0	$213.9	$321.2
Trade	$381.1	$60.7	$22.8	$381.3	$845.9
Finance, insurance, & real estate	$95.0	$23.1	$3.4	$176.2	$297.7
Motels, eating/drinking, and amusement/recreation	$138.1	$20.3	$6.6	$145.2	$310.2
Consumer and business services	$175.2	$27.2	$5.1	$484.4	$691.9
Medical/education/social services	$382.4	$107.2	$30.6	$447.8	$968.0
Local, State, and Federal government	$9,266.9	$869.9	$425.6	$638.0	$11,200.4
TOTAL	$10,600.4	$1,138.3	$505.5	$2,927.3	$15,171.5

Source: Results from simulating the economic impact assessment models using estimates of existing operations and maintenance spending levels.

5.1.2 Paradise Model Area

5.1.2.1 Recreation Activity-Related Effects

Spending

Current annual spending in the Paradise Model Area associated with recreation activity at the Oroville Facilities is estimated to total $4.8 million, accounting for 16 percent of total spending in Butte County associated with recreation activity at the Oroville Facilities (Table 5.1-1). An estimated 82 percent of the expenditures is made by residents of the Paradise Model Area, 4 percent is made by nonlocal visitors (i.e., those residing within Butte County but outside of the model area), and 14 percent is made by out-of-County visitors (i.e., those residing outside of Butte County).

Of the total recreation activity-related spending in the model area, 49 percent is made at service stations and food stores. Among nonlocal visitors, 65 percent of spending is at service stations and food stores. For out-of-County visitors, spending at food stores, miscellaneous retail businesses, service stations, and hotel and lodging places account for 84 percent of total spending.

Jobs

Current spending in the Paradise Model Area associated with recreation activity at the Oroville Facilities by out-of-area visitors generates an estimated 37 jobs in the model area, accounting for 6 percent of the total number of jobs generated by spending in Butte County associated with visitation to the Oroville Facilities (Table 5.1-2). (Note: Recreation-related spending by residents of the Paradise Model Area does support jobs locally but the analysis assumes that these jobs or comparable jobs would be supported by local spending even if recreation activity at the Oroville Facilities was not occurring.) Spending by out-of-County visitors generates 29, or 77 percent, of the total jobs generated in the Paradise Model Area. Of the estimated 37 jobs in the Paradise Model Area generated by visitor spending, an estimated 17 are in the trade sector and 9 are in the motels, eating and drinking places, and amusement and recreation services sector.

Earnings

Earnings associated with jobs created by out-of-area visitor spending are estimated to total about $0.7 million in the Paradise Model Area. Similar to employment effects, earnings effects are estimated to be concentrated in the trade and the motels, eating and drinking places, and amusement and recreation services sectors, with 63 percent of the earnings concentrated in these sectors (Table 5.1-3). Earnings in the government sector and the medical, education, and social services sector, together accounting for 25 percent of total earnings, also are relatively large.

5.1.2.2 Facilities Operation and Maintenance Effects

Jobs

Current expenditures made by State agencies for O&M of the Oroville Facilities generate an estimated 36 jobs in the Paradise Model Area (Table 5.1-4). The majority of these jobs (23) is in the local, State, and Federal government sectors.

Earnings

Earnings in the Paradise Model Area generated by current O&M expenditures total an estimated $1.1 million, with the local, State, and Federal government sectors receiving 76 percent of these earnings (Table 5.1-5). Of the remaining earnings, 15 percent is concentrated in the medical, education, and social services sector and the trade sector.

5.1.3 Biggs-Gridley Model Area

5.1.3.1 Recreation Activity-Related Effects

Spending

Current annual spending in the Biggs-Gridley Model Area associated with recreation activity at the Oroville Facilities is estimated to total about $1.4 million, accounting for 4 percent of total spending in Butte County by visitors to the Oroville Facilities (Table 5.1-1). An estimated 53 percent of the expenditures is made by residents of the model area, 3 percent is made by nonlocal visitors (i.e., those residing within Butte County but outside of the model area), and 44 percent is made by out-of-County visitors (i.e., those residing outside of Butte County).

The majority of the recreation activity-related spending (72 percent) is made at food stores, service stations, and eating and drinking places. For out-of-area visitor spending, these businesses account for 79 percent of spending.

Jobs

Current spending in the Biggs-Gridley Model Area associated with recreation activity at the Oroville Facilities by out-of-area visitors generates few jobs in the area. A total of 22 jobs is estimated to be generated by out-of-area visitor spending, with all but one of these jobs related to the spending by out-of-County visitors (Table 5.1-2). (Note: Recreation-related spending by residents of the Biggs-Gridley Model Area does support jobs locally but the analysis assumes that these jobs or comparable jobs would be supported by local spending even if recreation activity at the Oroville Facilities was not occurring.) Of the estimated 22 jobs created in the Biggs-Gridley Model Area, 20 are in the trade, motels, eating and drinking, and amusement and recreation services sectors.

Earnings

Earnings associated with jobs created by out-of-area visitor spending are estimated to total about $0.4 million in the Biggs-Gridley Model Area. Similar to employment effects, earnings effects are estimated to be concentrated in the trade, motels, eating and drinking, and amusement and recreation services sectors, with 83 percent of the earnings concentrated in these sectors (Table 5.1-3).

5.1.3.2 Facilities Operations and Maintenance Effects

Jobs

Current O&M expenditures made by State agencies for recreation and non-recreation facilities generate an estimated 18 jobs in the Biggs-Gridley Model Area (Table 5.1-4). Most of these jobs are in the local, State, and Federal government sectors of the model area's economy.

Earnings

Earnings in the Biggs-Gridley Model Area generated by facilities O&M expenditures currently total an estimated $0.5 million, with 84 percent of the earnings concentrated in the local, State, and Federal government sectors of the model area's economy (Table 5.1-5).

5.1.4 Chico Model Area

5.1.4.1 Recreation Activity-Related Effects

Spending

Current spending in the Chico Model Area associated with recreation activity at the Oroville Facilities is estimated to total about $4.1 million annually, accounting for 13 percent of total spending in Butte County associated with recreation activity at the Oroville Facilities (Table 5.1-1). An estimated 80 percent of the expenditures is made by residents of the model area, 10 percent is made by nonlocal visitors (i.e., those residing within Butte County but outside of the model area), and 10 percent is made by out-of-County visitors (i.e., those residing outside of Butte County).

Of the total recreation activity-related spending in the model area, 73 percent is made at food stores, service stations, and miscellaneous retail businesses. Among nonlocal visitors, 87 percent of spending is at food stores and miscellaneous retail businesses. For out-of-County visitors, spending at service stations and eating and drinking places accounts for 54 percent of total spending.

Jobs

Current spending in the Chico Model Area associated with recreation activity at the Oroville Facilities by out-of-area visitors generates an estimated 150 jobs in the model area, accounting for 23 percent of the total number of jobs generated by spending in Butte County associated with the Oroville Facilities (Table 5.1-2). (Note: Recreation-related spending by residents of the Chico Model Area does support jobs locally but the analysis assumes that these jobs or comparable jobs would be supported by local spending even if recreation activity at the Oroville Facilities was not occurring.) Spending by out-of-County visitors generates 114, or 76 percent, of the total jobs generated in the Chico Model Area. Of the estimated 150 jobs created in the Chico Model Area, 35 are in the trade sector and 33 are in the consumer and businesses services sector.

Earnings

Earnings associated with jobs created by out-of-area visitor spending are estimated to total approximately $3.1 million in the Chico Model Area. Similar to employment effects, earnings effects are estimated to be concentrated in the trade and consumer and business services sectors, with 43 percent of the earnings concentrated in these sectors (Table 5.1-3). Earnings in the medical, education, and social services sector, accounting for 14 percent of total earnings, also are relatively large.

5.1.4.2 Facilities Operations and Maintenance Effects

Jobs

Current expenditures made by State agencies for O&M of the Oroville Facilities generate an estimated 125 jobs in the Chico Model Area (Table 5.1-4). Reflecting Chico's role as a regional retail and services sector, many of these jobs are in the consumer and business services sector (24 jobs), the trade sector (18 jobs), and the medical, education, and social services sector (18 jobs). The local, State, and Federal government sector accounts for 19 jobs generated by O&M expenditures at the Oroville Facilities.

Earnings

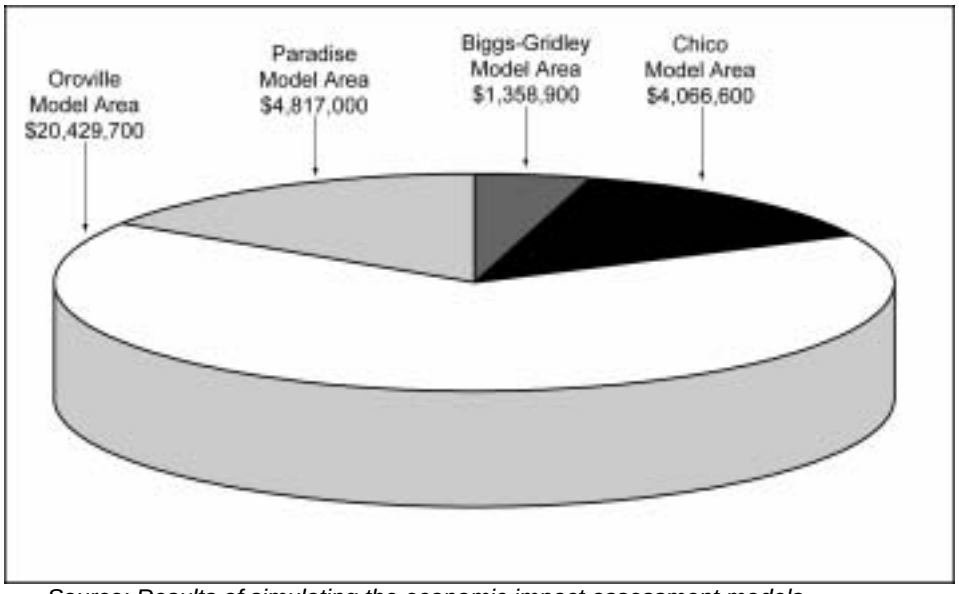
Earnings in the Chico Model Area generated by facilities O&M expenditures currently total an estimated $2.9 million, with 45 percent of the earnings concentrated in the consumer and business services sector, the medical, education, and social services sector, and the trade sector (Table 5.1-5). The local, State, and Federal government sectors account for 22 percent of the model area's earnings generated by O&M expenditures at the Oroville Facilities.

5.1.5 Butte County (Total Countywide Effects)

5.1.5.1 Recreation Activity-Related Effects

Spending

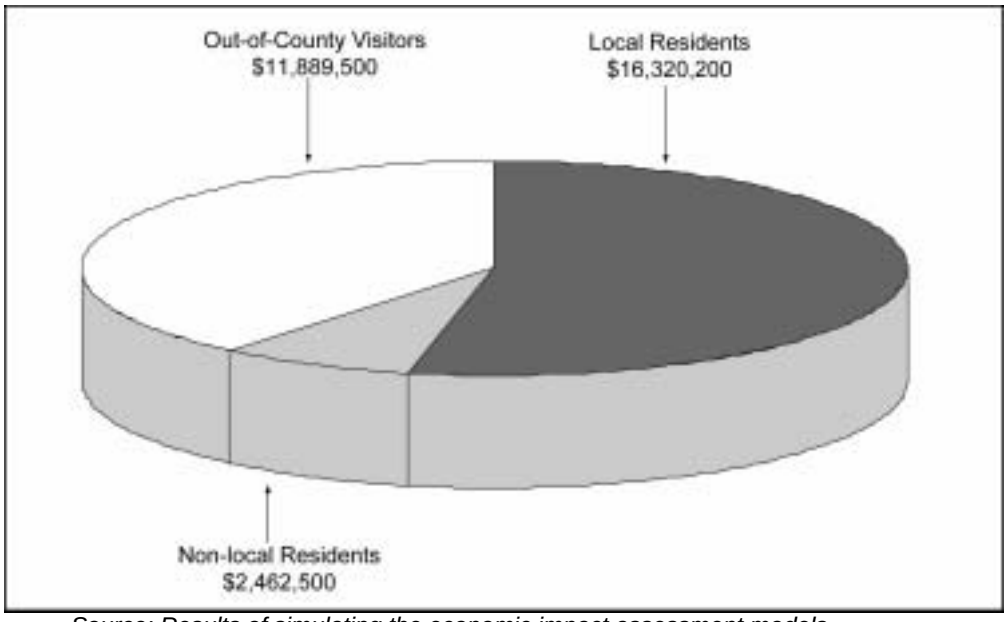
Current annual spending in Butte County associated with all recreation activity at the Oroville Facilities is estimated to total $30.7 million (Table 5.1-1). The distribution of this spending by model area is shown in Figure 5.2-1 and by type of visitor in Figure 5.2-2. An estimated 61 percent of the expenditures is made by residents of the County and 39 percent is made by out-of-County visitors.



Source: Results of simulating the economic impact assessment models.

Figure 5.1-1. Distribution of current recreation-related spending by model area.

Of the estimated total recreation-related spending in the County associated with the Oroville Facilities, 24 percent is made at service stations, 23 percent is made at food stores, and 17 percent is made at miscellaneous retail businesses. Among out-of-County visitors, 22 percent of spending is at service stations and 20 percent is at food stores. Much of out-of-County visitor spending is also made at eating and drinking places (15 percent) and miscellaneous retail businesses (14 percent).



Source: Results of simulating the economic impact assessment models.

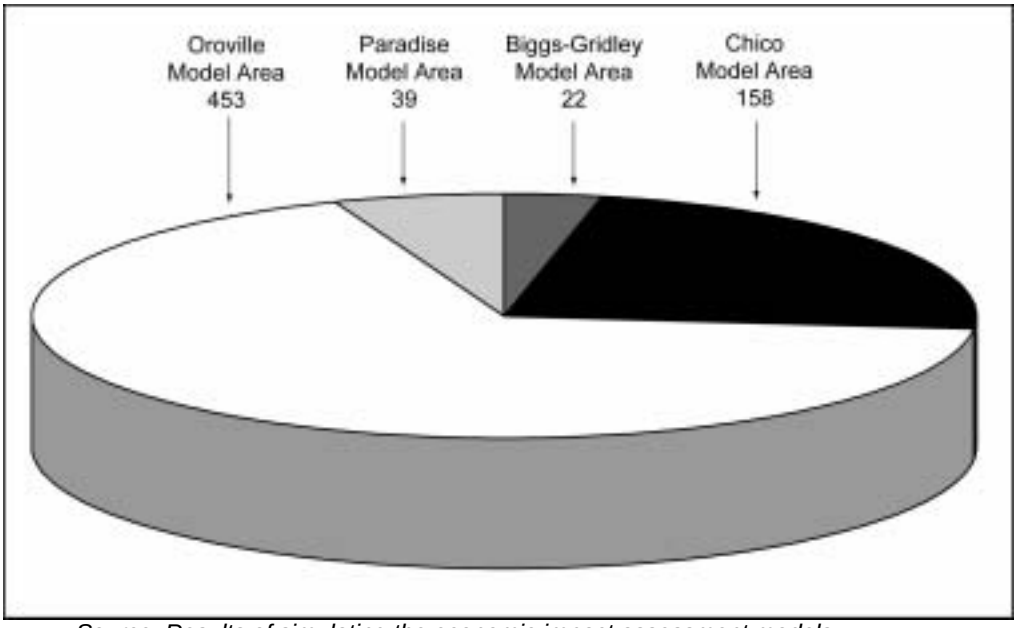
Figure 5.1-2. Distribution of current recreation-related spending in Butte County by type of visitor.

Jobs

Current spending associated with recreation activity at the Oroville Facilities by persons who do not reside in Butte County generates an estimated 555 jobs in the County, accounting for 84 percent of the total number of jobs in Butte County generated by spending by out-of-area residents (Table 5.1-2 and Figure 5.1-3). (Note: Recreation-related spending by residents of Butte County does support jobs locally but the analysis assumes that these jobs or comparable jobs would be supported by local spending even if recreation activity at the Oroville Facilities was not occurring.) Of the jobs generated by out-of-County visitor spending, an estimated 276 jobs are in the trade sector and 169 jobs are in the motels, eating and drinking places, and amusement and recreation services sector.

Earnings

Earnings associated with jobs created by out-of-County visitor spending are estimated to total about $12.8 million in Butte County. Similar to employment effects, earnings effects generated by out-of-County visitor spending are estimated to be concentrated in the trade and the motels, eating and drinking places, and amusement and recreation services sectors, with 59 percent of the earnings concentrated in these sectors (Table 5.1-3). Earnings in the government sector, accounting for 15 percent of total earnings, also are relatively large.



Source: Results of simulating the economic impact assessment models.

Figure 5.1-3. Distribution of estimated jobs generated by existing out-of-County visitor and non-local spending by model area.

5.1.5.2 Facilities Operations and Maintenance Effects

Jobs

Current expenditures made by State agencies for O&M of the Oroville Facilities generate an estimated 498 jobs in Butte County (Table 5.1-4). As expected, the majority of the jobs are located in the government sector, which accounts for 297 jobs, or 59 percent of the total O&M-related employment in the County. O&M expenditures indirectly generate jobs in other sectors of the County's economy, including 41 jobs in the trade sector and 51 jobs in the medical, education, and social services sector.

Earnings

Earnings in Butte County generated by current O&M expenditures total an estimated $15.2 million, with the government sector benefiting from 74 percent of these earning (Table 5.1-5). Of the remaining earnings, 6 percent is concentrated in the medical, education, and socials services sector.

5.2 ECONOMIC EFFECTS OF PROJECTED FUTURE RECREATION ACTIVITY

Economic effects generated by recreation activity associated with the Oroville Facilities also were evaluated based on recreation use levels projected for 2020. Projections of recreation use were developed based on consideration of population growth and recreation activity trends, as described in the Relicensing Study R-12 – *Projected*

Recreation Use. Economic effects resulting from O&M activities were not evaluated for projected future conditions because they are assumed to be similar to current conditions. The economic effects within each of the four model areas and Countywide are described in the following sections.

5.2.1 Oroville Model Area

Within the Oroville Model Area, spending associated with recreation activity at the Oroville Facilities in 2020 is estimated to total about $25.8 million, representing a 26 percent increase over current spending levels (Table 5.2-1). The spending by out-of-area visitors (out-of-County and nonlocal residents of the model area) is estimated to support 574 jobs and $10.9 million in earnings in the model area in 2020 (Tables 5.2-2 and 5.2-3). These changes represent a 26 percent increase in jobs and earnings relative to current levels.

5.2.2 Paradise Model Area

Spending within the Paradise Model Area associated with recreation activity at the Oroville Facilities in 2020 is estimated to total $6.2 million, representing a 29 percent increase over current spending levels (Table 5.2-1). The spending by out-of-area visitors is estimated to support 49 jobs and about $0.9 million in earnings in the model area in 2020 (Tables 5.2-2 and 5.2-3). These changes represent a 28 percent increase in jobs and a 29 percent increase in earnings relative to current levels.

5.2.3 Biggs-Gridley Model Area

Spending in the Biggs-Gridley Model Area associated with recreation activity at the Oroville Facilities in 2020 is estimated to total $1.7 million, representing a 25 percent increase over current spending levels (Table 5.2-1). The spending by out-of-area visitors to the model area is estimated to support 26 jobs and about $0.4 million in earnings in 2020 (Tables 5.2-2 and 5.2-3). An estimated 86 percent of the jobs and 83 percent of the earnings are anticipated to be in the trade, motels, eating and drinking, and amusement and recreation services sectors.

5.2.4 Chico Model Area

Spending in the Chico Model Area associated with recreation activity at the Oroville Facilities in 2020 is projected to total about $5.1 million, representing a 26 percent increase over current spending levels (Table 5.2-1). Spending in the Chico Model Area by out-of-area visitors is estimated to support 188 jobs and almost $4.0 million in earnings in the model area in 2020 (Tables 5.2-2 and 5.2-3). These changes represent a 20 percent increase in jobs and a 26 percent increase in earnings relative to current levels.

Table 5.2-1. Estimated spending generated by projected future (2020) visitation to the Oroville Facilities.

Type of Spending/Model Sector	Oroville Model Area ($1,000)	Paradise Model Area ($1,000)	Biggs-Gridley Model Area ($1,000)	Chico Model Area ($1,000)	Butte County Total ($1,000)
Spending by Local Residents:					
Food stores	$2,705.5	$1,080.6	$253.0	$1,012.6	$5,051.7
Automotive dealers and service stations	$2,221.5	$1,408.9	$293.4	$1,155.4	$5,079.2
Apparel and accessory stores	$384.9	$34.5	$53.8	$246.2	$719.4
Eating and drinking places	$541.9	$86.4	$53.1	$11.5	$692.9
Miscellaneous retail	$2,489.7	$592.8	$151.3	$863.0	$4,096.8
Hotels and lodging places	$97.2	$0.0	$0.0	$4.1	$101.3
Amusement and recreation services	$268.6	$323.9	$2.1	$95.0	$689.6
State government	$1,247.5	$839.2	$95.7	$283.5	$2,465.9
Other	$591.0	$730.9	$17.0	$425.3	$1,764.2
Subtotal	$10,547.8	$5,097.2	$919.5	$4,096.7	$20,661.2
Spending by Nonlocal Visitors:					
Food stores	$400.1	$83.6	$17.4	$241.9	$743.0
Automotive dealers and service stations	$841.0	$95.6	$4.6	$37.9	$979.1
Apparel and accessory stores	$32.0	$7.8	$7.6	$6.4	$53.8
Eating and drinking places	$251.9	$6.0	$0.0	$24.2	$282.1
Miscellaneous retail	$241.9	$24.9	$7.6	$224.0	$498.4
Hotels and lodging places	$50.1	$0.0	$0.0	$0.0	$50.1
Amusement and recreation services	$99.4	$13.7	$0.0	$0.0	$113.1
State government	$115.2	$15.4	$0.0	$0.7	$131.3
Other	$264.3	$28.3	$16.9	$0.1	$309.6
Subtotal	$2,295.9	$275.4	$54.1	$535.1	$3,160.5
Spending by Out-of-County Visitors:					
Food stores	$2,612.1	$248.3	$131.1	$19.7	$3,011.2
Automotive dealers and service stations	$2,969.4	$152.6	$153.7	$105.2	$3,380.9
Apparel and accessory stores	$233.1	$4.3	$3.8	$48.9	$290.1
Eating and drinking places	$1,758.0	$49.5	$309.0	$169.9	$2,286.4
Miscellaneous retail	$1,839.6	$154.3	$33.0	$62.5	$2,089.4
Hotels and lodging places	$1,082.9	$134.8	$73.3	$35.7	$1,326.7
Amusement and recreation services	$1,837.6	$53.9	$6.9	$16.3	$1,914.7
State government	$310.0	$4.1	$11.3	$13.1	$338.5
Other	$271.2	$20.9	$0.0	$26.5	$318.6
Subtotal	$12,913.9	$822.7	$722.1	$497.7	$14,956.4
Total Recreation-Related Spending:					
Food stores	$5,717.6	$1,412.6	$401.5	$1,274.2	$8,805.9
Automotive dealers and service stations	$6,032.0	$1,657.0	$451.7	$1,298.5	$9,439.2
Apparel and accessory stores	$650.0	$46.7	$65.2	$301.5	$1,063.4
Eating and drinking places	$2,551.8	$141.9	$362.1	$205.6	$3,261.4
Miscellaneous retail	$4,571.2	$772.0	$191.9	$1,149.4	$6,684.5
Hotels and lodging places	$1,230.2	$134.8	$73.3	$39.8	$1,478.1
Amusement and recreation services	$2,205.6	$391.5	$9.1	$111.3	$2,717.5
State government	$1,672.7	$858.8	$107.0	$297.3	$2,935.8
Other	$1,126.6	$780.1	$34.0	$451.9	$2,392.6
Subtotal	$25,757.7	$6,195.3	$1,695.7	$5,129.5	$38,778.2

Note: Columns and rows may not sum to totals due to independent rounding of spending for individual sectors and model areas.
Source: Results from simulating the economic impact assessment models using estimates of projected future (2020) visitor spending levels.

Table 5.2-2. Estimated jobs generated by projected future (2020) visitor spending.

Type of Visitor/Model Sector	Oroville Model Area	Paradise Model Area	Biggs-Gridley Model Area	Chico Model Area	Butte County Total
Nonlocal Visitor Effects:					
Agriculture, mining, sand, and gravel	1	0	0	1	2
Construction	0	0	0	2	2
Manufacturing	0	0	0	1	1
Transportation, public utilities, publishing, and communications	1	0	0	2	3
Trade	42	6	1	19	68
Finance, insurance, & real estate	1	0	0	2	3
Motels, eating/drinking, and amusement/recreation	15	2	0	5	22
Consumer and business services	7	2	0	7	16
Medical/education/social services	5	1	0	4	10
Local, State, and Federal government	11	1	0	1	13
Subtotal	83	12	1	44	140
Out-of-County Visitor Effects:					
Agriculture, mining, sand, and gravel	4	0	0	2	6
Construction	0	0	0	11	11
Manufacturing	1	0	0	5	6
Transportation, public utilities, publishing, and communications	6	0	0	10	16
Trade	231	17	8	25	281
Finance, insurance, & real estate	5	1	0	9	15
Motels, eating/drinking, and amusement/recreation	143	11	15	24	193
Consumer and business services	19	2	0	35	56
Medical/education/social services	29	4	1	18	52
Local, State, and Federal government	53	2	1	5	61
Subtotal	491	37	25	144	697
Total Visitor Effects:					
Agriculture, mining, sand, and gravel	5	0	0	3	8
Construction	0	0	0	13	13
Manufacturing	1	0	0	6	7
Transportation, public utilities, publishing, and communications	7	0	0	12	19
Trade	273	23	9	44	349
Finance, insurance, & real estate	6	1	0	11	18
Motels, eating/drinking, and amusement/recreation	158	13	15	29	215
Consumer and business services	26	4	0	42	72
Medical/education/social services	34	5	1	22	62
Local, State, and Federal government	64	3	1	6	74
Total	574	49	26	188	837

Source: Results from simulating the economic impact assessment models using estimates of projected future (2020) nonlocal and out-of-County visitor spending levels.

Table 5.2-3. Estimated earnings generated by projected future (2020) visitor spending.

Type of Visitor/Model Sector	Oroville Model Area ($1,000)	Paradise Model Area ($1,000)	Biggs-Gridley Model Area ($1,000)	Chico Model Area ($1,000)	Butte County Total ($1,000)
Non-local Visitor Effects:					
Agriculture, mining, sand, and gravel	$7.9	$1.4	$0.2	$7.5	$17.0
Construction	$1.5	$2.0	$0.1	$54.7	$58.3
Manufacturing	$3.7	$0.2	$0.1	$27.9	$31.9
Transportation, public utilities, and communications	$26.2	$2.3	$0.7	$63.9	$93.1
Trade	$821.0	$121.7	$21.4	$366.0	$1,330.0
Finance, insurance, & real estate	$23.7	$5.9	$0.4	$46.3	$76.3
Motels, eating/drinking, and amusement/recreation	$186.7	$12.8	$0.6	$46.7	$246.9
Consumer and business services	$141.7	$18.7	$5.9	$141.6	$308.0
Medical/education/social services	$71.6	$24.8	$3.0	$104.8	$204.2
Local, State, and Federal government	$359.0	$35.8	$0.4	$49.5	$444.7
Subtotal	$1,643.0	$225.6	$32.8	$909.0	$2,810.4
Out-of-County Visitor Effects:					
Agriculture, mining, sand, and gravel	$47.6	$5.3	$3.4	$33.6	$89.9
Construction	$8.9	$6.5	$1.1	$261.1	$277.5
Manufacturing	$21.1	$0.6	$0.6	$140.3	$162.6
Transportation, public utilities, publishing, and communications	$159.8	$8.1	$8.0	$297.9	$473.8
Trade	$4,292.6	$343.2	$188.2	$514.9	$5,338.9
Finance, insurance, & real estate	$133.8	$21.3	$4.3	$216.0	$375.4
Motels, eating/drinking, and amusement/recreation	$2,051.6	$113.6	$157.8	$242.3	$2,565.4
Consumer and business services	$355.4	$36.2	$7.3	$693.8	$1,092.8
Medical/education/social services	$398.6	$90.6	$26.3	$459.0	$974.5
Local, State, and Federal government	$1,741.3	$83.6	$13.0	$203.1	$2,041.0
Subtotal	$9,210.8	$709.0	$410.1	$3,061.9	$13,391.7
Total Visitor Effects:					
Agriculture, mining, sand, and gravel	$55.5	$6.7	$3.6	$41.1	$106.9
Construction	$10.4	$8.5	$1.2	$315.8	$335.8
Manufacturing	$24.8	$0.8	$0.7	$168.2	$194.5
Transportation, public utilities, publishing, and communications	$186.0	$10.4	$8.7	$361.8	$566.9
Trade	$5,113.6	$464.9	$209.6	$880.9	$6,668.9
Finance, insurance, & real estate	$157.5	$27.2	$4.7	$262.3	$451.7
Motels, eating/drinking, and amusement/recreation	$2,238.3	$126.4	$158.4	$289.0	$2,812.3
Consumer and business services	$497.1	$54.9	$13.2	$835.4	$1,400.8
Medical/education/social services	$470.2	$115.4	$29.3	$563.8	$1,178.7
Local, State, and Federal government	$2,100.3	$119.4	$13.4	$252.6	$2,485.7
Total	$10,853.8	$934.6	$442.9	$3,970.9	$16,202.1

Note: Columns and rows may not sum to totals due to independent rounding of earnings for individual sectors and model areas.
Source: Results from simulating the economic impact assessment models using estimates of projected future (2020) nonlocal and out-of-County visitor spending levels.

5.2.5 Butte County (Total Countywide Effects)

Countywide, spending associated with all recreation activity at the Oroville Facilities in 2020 is estimated to total about $38.8 million (Table 5.2-1), representing a 26% increase over current spending levels. The spending by visitors who do not reside in Butte County is estimated to support 697 jobs and about $13.4 million in earnings in Butte County (Tables 5.2-2 and 5.2-3). (Note: jobs and earnings generated by the spending of Butte County residents would not represent net increases in jobs and earnings within the County.) The jobs and earnings generated by out-of-County visitor spending in 2020 represent increases of 26 percent over current levels.

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6.0 CONCLUSIONS

In fulfilling the need for the economic impacts study, as described in Section 2.0, this report provides an assessment of socioeconomic effects resulting from recreation activity and O&M expenditures related to the Oroville Facilities. In accordance with FERC guidelines, the assessment focused on estimating employment and income effects associated with recreation use in the study area. The results and conclusions of this report also will help DWR meet FERC's direction regarding preparation of a comprehensive recreation plan.

The primary objective of this *Recreation Activity, Spending, and Associated Economic Impacts* study is to estimate the effects of spending activity generated by current and projected recreation use and current levels of O&M of the Oroville Facilities on local business sales, employment, and personal income. A secondary objective of the economic impacts study was to gain a better understanding of the relationship between the Oroville Facilities and economic development and growth within the region, particularly focused on the greater Oroville area. This understanding establishes an analytical framework for evaluating operating and facility development strategies for improving economic conditions in the region.

The conclusions of the analysis of economic effects discussed in the following sections were drawn from the results presented in Section 5.0, Study Results and Discussion. This report was prepared under the general direction of DWR staff. Opinions, findings, and conclusions expressed in this report are those of the authors. This report does not express the official position of DWR unless specifically approved by the Director or his designee.

6.1 EFFECTS OF CURRENT RECREATION ACTIVITY AND O&M EXPENDITURES

6.1.1 Oroville Model Area

As expected, the economic effects of current recreation activity and O&M expenditures at the Oroville Facilities are relatively concentrated in the Oroville Model Area when compared to effects within the other model areas. Combined, recreation activity by out-of-area visitors and O&M-related expenditures account for an estimated 772 jobs in the Oroville Model Area, or 4.2 percent of the area's total employment. Earnings associated with these activities account for an estimated $19.2 million annually, or about 4.7 percent of the model area's total earnings.

6.1.2 Paradise Model Area

Current levels of recreation activity and O&M expenditures on the Oroville Facilities have a relatively small effect on the economy of the Paradise Model Area because of relatively low levels of visitor spending as compared to visitor spending in the Oroville Model Area, and because of leakage to the Chico Model Area of indirect sales and jobs generated by visitor spending. Combined, recreation activity by out-of-area visitors and

O&M-related expenditures account for an estimated 74 jobs and about $1.6 million in annual earnings in the Paradise Model Area, or less than 1 percent of the area's total employment and earnings. Although recreation activity-related spending by visitors to the Paradise Model Area is similar to spending in the Chico Model Area, total employment effects in the Paradise area are only 25 percent of the effects in the Chico area because the Chico Model Area captures much of the business-to-business sales in the study area.

6.1.3 Biggs-Gridley Model Area

Similar to the Paradise Model Area, jobs and earnings generated by visitor spending and O&M-related expenditures in the Biggs-Gridley Model Area account for a relatively small share of the economic base of the model area. Combined, spending by out-of-area visitors and O&M-related expenditures account for an estimated 39 jobs and about $0.9 million in annual earnings in the Biggs-Gridley Model Area, or less than 1 percent of the area's total employment and earnings.

6.1.4 Chico Model Area

Current levels of recreation activity and O&M expenditures related to the Oroville Facilities have a larger effect on jobs and earnings in the Chico Model Area than in the Biggs-Gridley and Paradise Model Areas. Combined, spending by out-of-area visitors and O&M-related expenditures account for an estimated 275 jobs and about $6.1 million in annual earnings in the Chico Model Area. However, when viewed in the context of the Chico Model Area's larger and more diversified economy, these effects are smaller than the effects in the Biggs-Gridley and Paradise Model Areas.

6.1.5 Butte County

Current levels of recreation activity and O&M related to the Oroville Facilities contribute a relatively small but important increment to the County's economic base. Combined, spending by out-of-area visitors and O&M-related expenditures account for an estimated 1,160 jobs and about $28.0 million in annual earnings. When viewed in the context of the Butte County economy, these levels of employment and earnings account for about 1.2 percent of total Countywide employment and about 1.3 percent of total Countywide earnings. Recreation activity-related spending by local residents also supports jobs and earnings in local businesses that rely on this spending.

6.2 EFFECTS OF PROJECTED FUTURE RECREATION ACTIVITY

Countywide, jobs and earnings generated by recreation activity at the Oroville Facilities by out-of-area visitors is estimated to increase by 26 percent between 2003 and 2020. This increase is less than the projected increase in population growth in Butte County, which is projected to increase by 47 percent between 2003 and 2020. Assuming that the economies of the community modeling areas within Butte County grow at rates similar to the projected population growth by 2020, the economic effects generated by

out-of-area visitor spending would account for a smaller share of the economies of each area. Currently, spending by out-of-area visitors account for about 4.2 percent of the jobs in the Oroville Model Area and less than 1 percent of the jobs in the Paradise Model Area, Chico Model Area, and the Biggs-Gridley Model Area. Countywide, out-of-area spending accounts for about 1.2 percent of the jobs in the County.

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APPENDIX A

Description of the Economic Impact Assessment Models

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DESCRIPTION OF THE ECONOMIC IMPACT ASSESSMENT MODELS

INTRODUCTION

Following is a detailed description of the economic impact assessment models (community-level and intercommunity input-output [I-O] models) that are a component of the overall Economic-Fiscal Model developed for this study and for the *Fiscal Impacts* study (Relicensing Study R-19). These economic impact assessment models are used to evaluate the economic effects of recreation activity and operations and maintenance (O&M) of the Oroville Facilities and generate estimates of the economic effects, including employment and earnings effects, reported in this study's results.

The economic impact assessment component of the Economic-Fiscal Model comprises four linked community-level models that together include data for all areas within Butte County. These areas include the Oroville Model Area, the Chico Model Area, the Paradise Model Area, and the Biggs-Gridley Model Area. The economic impact component of the Economic-Fiscal Model captures inter-industry trade patterns and commuting patterns among these four community model areas. Readers interested in the basics of I-O analysis are directed to Miller and Blair (1985). The fundamentals of community and intercommunity modeling, as opposed to inter-industry modeling, are presented in Robison and Miller (1991) and Robison (1995).

The community-level economic impact assessment models incorporate data from four multi-sheet MS Excel spreadsheet files for each community model area. These spreadsheet files convey the basic modeling algorithms used by the I-O component of the Economic-Fiscal Model, and they document adjustments made to the secondary modeling data. The final model is in electronic executable form as an MS Excel spreadsheet.

DESCRIPTION OF WORKSHEETS

The function of the worksheets that comprise the economic impact assessment models (Figure A-1) is described below.

IMPLAN

The IMPLAN worksheet is the primary source of data on the national economy. It is used as a source worksheet for computing coefficients that are used to regionalize the national economy. These coefficients allow the economic impact assessment models to transfer national economic relationships such as tax and investment rates to a particular region (model area). Data supplied by the IMPLAN worksheet include national employment, earnings, sales (total output), employment/output ratios, earnings/output ratios, earnings/job ratios, profits, proprietary earnings, indirect business taxes, and total value added.

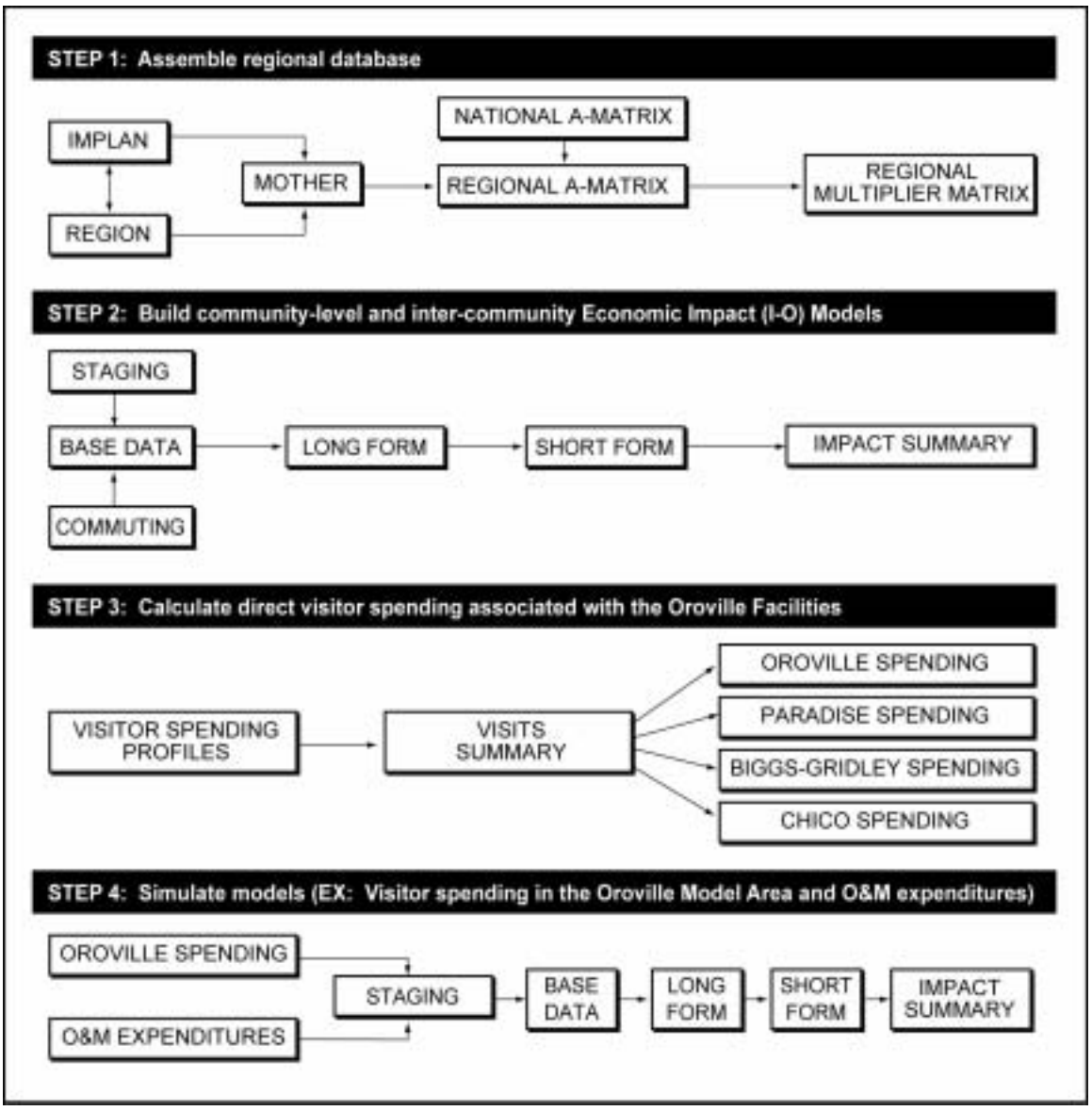

Figure A-1. Development of the economic impact assessment models and the relationship of model worksheets.

REGION

The REGION worksheet is the source worksheet for data on the study area's economy. It includes data on employment, earnings, absentee claims on profits, and in-commuting by industry for every industry (528) in the national input-output model. If the industry is not present in the region, zeros are entered for that industry in a region (model area). The worksheet also includes data on non-wage earnings (dividends, interest, rent and transfer payment). Census data on population, households, seasonal home spending, out-commuting, population in working families, and population in non-working families also are included in the REGION worksheet.

MOTHER

The MOTHER worksheet is used to calculate components of value added, consumption, and exports for the region's economy. It uses data from REGION and IMPLAN to accomplish this. The worksheet references data on the region's economy (REGION) and multiplies these variables by national coefficients in IMPLAN to compute each of the components of value added (proprietary earnings, profits, profits that stay in the region, and regional total output [sales]). It also uses a macro to calculate non-basic requirements and exports. This macro references both IMPLAN data and the NATIONAL A-MATRIX (technical coefficients matrix). Finally, the MOTHER worksheet calculates components of household and government consumption. This is accomplished by computing national coefficients from IMPLAN for each component of consumption and using these coefficients to calculate regional consumption.

REGIONAL A-MATRIX

The REGIONAL A-MATRIX worksheet is formed from the NATIONAL A-MATRIX (technical coefficients) using data from the MOTHER worksheet. A macro first deletes all industries from the NATIONAL A-MATRIX that are not present in the region (model area). Then, a second macro adjusts the NATIONAL A-MATRIX to accommodate exports. The model can adjust the NATIONAL A-MATRIX upwards or downwards for any given industry to absorb more local output or to allow greater exports from that industry. Finally, a third macro adds rows and columns to account for household consumption and investment.

REGIONAL MULTIPLIER MATRIX

The REGIONAL MULTIPLIER MATRIX is derived from inverting the REGIONAL A-MATRIX $(I-A)^{-1}$.

COMMUTING

The COMMUTING worksheet shows commuting patterns between the communities in Butte County. It is used as source data for allocating employment impacts to community models and in developing inter-community linkages.

BASE DATA

The BASE DATA worksheet is used to calculate economic impacts. Changes in final demand (e.g., visitor spending) can be entered for any given industry and the BASE DATA worksheet multiplies these changes by the multiplier matrix, then totals employment, earnings, and sales impacts for every industry in the region (model area).

STAGING

Because of the need to calculate economic (and fiscal) impacts of a variety of actions and to add together impacts of several geographic areas, a worksheet titled STAGING was developed. The STAGING worksheet is used to calculate and link changes in final demand to the BASE DATA worksheets.

LONG FORM

The LONG FORM worksheet is used to display the results of the BASE DATA worksheet. It reports baseline sales, earning, and employment; changes or impacts on sales, earnings, and employment; and percent change in sales, earnings, and employment for every industry present in the region (model area).

SHORT FORM

The SHORT FORM worksheet is used to display impacts in a more concise format than the LONG FORM worksheet. It adds together impacts from similar industrial sectors and presents the results in an aggregated form. For example, all of the industries in the service sector are reported in a single category labeled “service.” It reports baseline conditions and changes in sales, earnings, and employment for sectors comparable to the Standard Industrial Classification (SIC) two digit-reporting format.

IMPACT SUMMARY

The IMPACT SUMMARY worksheet reports the impacts displayed in the SHORT FORM worksheet of each of the four community-level models. It also totals impacts in the four model areas to display total impacts in Butte County.

VISITOR SPENDING PROFILES

The VISITOR SPENDING PROFILE worksheet contains data on the dollar amounts and distribution of visitor spending by type of visitor (local resident, nonlocal resident, and out-of-County resident) for the five recreation areas (Lake Oroville, Forebay, Afterbay, Oroville Wildlife Area, and the Feather River-Diversion Pool) that comprise the Oroville Facilities.

VISITS SUMMARY

The VISITS SUMMARY worksheet contains data on the number of visitor days to the five recreation areas that comprise the Oroville Facilities.

OROVILLE SPENDING

The OROVILLE SPENDING worksheet is used to compute visitor spending in the Oroville Model Area. Spending is computed by multiplying the total number of visitor days (VISITS SUMMARY) for each category of visitors (local residents, nonlocal residents, and nonresidents) by the spending profile (VISITOR SPENDING PROFILES) for that type of visitor.

PARADISE SPENDING

The PARADISE SPENDING worksheet is used to compute visitor spending in the Paradise Model Area. Spending is computed by multiplying the total number of visitor days (VISITS SUMMARY) for each category of visitors (local residents, nonlocal residents, and nonresidents) by the spending profile (VISITOR SPENDING PROFILES) for that type of visitor.

BIGGS-GRIDLEY SPENDING

The BIGGS-GRIDLEY SPENDING worksheet is used to compute visitor spending in the Biggs-Gridley Model Area. Spending is computed by multiplying the total number of visitor days (VISITS SUMMARY) for each category of visitors (local residents, nonlocal residents, and nonresidents) by the spending profile (VISITOR SPENDING PROFILES) for that type of visitor.

CHICO SPENDING

The CHICO SPENDING worksheet is used to compute visitor spending in the Chico Model Area. Spending is computed by multiplying the total number of visitor days (VISITS SUMMARY) for each category of visitors (local residents, nonlocal residents, and nonresidents) by the spending profile (VISITOR SPENDING PROFILES) for that type of visitor.

O&M EXPENDITURES

The O&M EXPENDITURES worksheet includes expenditure data for each of the three State agencies that operate and maintain Oroville Project facilities. These include the State Department of Water Resources, California State Parks and Recreation Department, and the California Department of Fish and Game. The worksheet takes payrolls and expenditures for local procurement of goods and services by each of these agencies and allocates these expenditures to each of the four community model areas.

WORKSHEET EXAMPLES

Examples of the model worksheets are provided in the following section as tables, along with information about the inputs and outputs for each worksheet. Because of the size of some of the worksheets and the many linkages between worksheets, not all of the worksheets and data sets comprising the models are included.

With the exception of tables showing baseline data, the values shown by the tables do not necessarily represent current or projected future economic conditions or effects. *Readers should not attempt to compare the information shown in the tables in this appendix with information reported in the main body of the report.* For more information on assumptions and methods employed in constructing the economic impact assessment models, refer to report section 4.0, "Methodology."

Table A-1. Baseline earnings and jobs (REGION Worksheet).

Oroville Model	Earnings ($1,000)	Jobs
Aggregate		
1 Agriculture	$17,711.78	1,368
26 Agricultural, forestry, fishery	$5,279.83	473
27 Landscape and horticultural service	$1,212.31	111

Source: IMPLAN ZIP Code-level data base (Minnesota IMPLAN Group 2002), modified using field data.

Description: Table A-1 includes baseline employment and wage and salary earnings data for the Oroville community-level model. Data for only the first three of the 528 industrial sectors in the model are shown in the table.

Inputs to Worksheet: Inputs to this worksheet are employment data provided by the model's data engine, which uses ZIP Code Business Patterns as its source data. The earnings data vector is formed using employment-output coefficients based upon Bureau of Economic Analysis data imbedded in the IMPLAN database.

Outputs of Worksheet: The data in this worksheet is used for calculations made by the MOTHER worksheet for Oroville.

Data Sources: Employment data is based on ZIP Code Business Patterns. Sub-County data was controlled to Butte County IMPLAN totals. Data was field verified with interviews of major employers and community leaders.

Links to Other Worksheets: The data is linked to the Oroville MOTHER worksheet.

Table A-2. In-commuter claims on earnings (REGION Worksheet).

Oroville Model	In-commuter Claims On Earnings (%)
1 Agriculture	11.2%
26 Agricultural, forestry, fishery	11.2%
27 Landscape and horticultural service	11.2%

Source: Derived using U.S. Census 2000 journey-to-work data and California Department of Transportation commuting data.

Description: Table A-2 shows data on in-commuter claims on earnings for the Oroville community-level model. Only the first three sectors of the 528 industrial sectors in the model are shown in the table.

Inputs to Worksheet: Inputs to this worksheet are earnings data provided by Table A-1 and a commuting matrix described for the following table (Table A-3).

Outputs of Worksheet: These coefficients scale the earnings data that are used in the MOTHER worksheet for Oroville.

Data Sources: In-commuter data were derived from secondary sources, including U.S. Census 2000 journey-to-work data and California Department of Transportation (Caltrans) commuting data. For the state government sector, data were collected for the commuting of State of California workers associated with the Oroville Facilities.

Links to Other Worksheets: These data are linked to the MOTHER worksheet and to the commuting matrix shown in Table A-3.

Table A-3. Commuting matrix (COMMUTING Worksheet).

Residing In:	Chico Area	Oroville Area	Paradise Area	Biggs-Gridley Area
Chico Area	73.9%	5.6%	7.4%	4.8%
Oroville Area	4.0%	88.8%	7.6%	4.1%
Paradise Area	19.0%	4.1%	81.5%	1.9%
Gridley/ Biggs Area	1.0%	0.5%	0.01%	82.3%
Outside the County (in-commuters)	2.1%	1.0%	2.5%	6.9%

Source: Derived using U.S. Census 2000 journey-to-work data and California Department of Transportation commuting data.

Description: Table A-3 shows commuting patterns in Butte County. For example, it shows that 88.8 percent of the people employed in Oroville are residents of Oroville and that the remaining 11.2 percent of the people who work in Oroville are in-commuters.

Inputs to Worksheet: Inputs to this table were derived based on secondary source data and field interviews.

Outputs of Worksheet: These data are used to allocate in-commuter and out-commuter earnings to the appropriate community model areas.

Data Sources: In-commuter data were derived from secondary data sources, including U.S. Census 2000 journey-to-work data and Caltrans commuting data, and was ground-truthed through interviews with knowledgeable local sources**.**

Links to Other Worksheets: The data are linked to the MOTHER worksheet and to the REGION worksheet. Data in this table are also linked to the population impacts spreadsheet in the fiscal component of the Economic-Fiscal Model.

Table A-4. Social accounting matrix (REGION Worksheet).

Social Accounting Matrix	Earnings ($1,000)	Percent
Earnings by place of work	$429,428	51.8%
Dividends, income and rent (DIR)	$47,859	5.8%
Transfers	$205,812	24.8%
Out-commuter income	$145,995	17.6%
TOTAL	**$829,094**	

Source: U.S. Census 2000 and internal model calculations.

Description: Table A-4 displays components of residents' income and the percentages of that income that are derived from individual income sources. Dividends, interest, and rent are property income. Transfers include social security, disability, retirement payment, public assistance, and other various government payments.

Inputs to Worksheet: Earnings by place of work are calculated in the REGION worksheet. Out-commuter income is calculated by multiplying the number of out-commuters by an average wage rate for each model area. Other data in the worksheet are provided by secondary sources.

Outputs of Worksheet: The social accounting matrix in this worksheet is used by the MOTHER worksheet to account for all sources of residents' income**.**

Data Sources: Earnings are calculated in the REGION worksheet. Dividends, interest, rent and transfers are derived from U.S. Census (2000) data.

Links to Other Worksheets: These data are used by the MOTHER worksheet in accounting for components of income. Data on earnings by place of work are supplied by the REGION worksheet.

Table A-5. Nonbasic requirements (MOTHER Worksheet).

Biggs-Gridley	
Model Sectors	**Non-Basic Requirements ($1,000)**
1 Agriculture	$284,156.90
26 Agricultural, forestry, fishery	$7,112.48
27 Landscape and horticultural service	$23,349.36
28 Iron ores	$288.57
29 Copper ores	$68.66
30 Lead and zinc ores	$23.39
31 Gold ores	$141.38
32 Silver ores	$5.39
33 Ferroalloy ores except vanadium	$11.89
34 Metal mining services	$12.35
35 Uranium-radium-vanadium ores	$127.34
36 Metal ores, not elsewhere classified	$51.80
37 Coal mining	$4,673.66
38 Natural gas and crude petroleum	$24,205.93
39 Natural gas liquids	$2,650.48
40 Dimension stone	$7,510.85
41 Sand and gravel	$5,475.95

Source: IMPLAN database (Minnesota IMPLAN Group 2002).

Description: Table A-5 shows non-basic requirements for each sector. Note that only the first few industrial sectors of 528-sector model are shown. Non-basic requirements are goods and services that are required to meet local production needs of industries in the study area. For example, sand and gravel are required by a number of industries

(particularly construction industries) as an input to the production of the commodity they produce; production of cement requires a considerable input of sand and gravel.

Inputs to Worksheet: Non-basic requirements are calculated by the IMPLAN database. The calculations are made by a GAUSS (type of programming software) macro based upon the NATIONAL A-MATRIX using national data from the Bureau of Economic Analysis.

Outputs of Worksheet: Non-basic requirements are used by the model to compute exports.

Data Sources: See "Inputs to Worksheet."

Links to Other Worksheets: Data from this worksheet are linked to other values in the MOTHER worksheet via a macro.

Table A-6. Social accounting data (REGION Worksheet).

Oroville Model Area	
Out-commuters	3,971
Seasonal homes	701
Summer home population	1859
Seasonal home spending ($1,000)	10
Population/labor ratio	1.17
Household Size	2.652628
Residents	48,811
Jobs by place of work	18,836
Less in-commuters	942
Plus out-commuters	3,971
Total residents with jobs	23,748
Population in working families	27,717
Population of working and non-working families	29,576
Households	11,150
Out-commuters	3,971
Households	18,401

Source: Derived from U.S. Census 2000 data and internal model calculations.

Description: Table A-6 shows a number of values that are required for model calculations.

Inputs to Worksheet: Inputs to this worksheet include data derived from several sources. Seasonal home data were derived from U.S. Census 2000 data. No secondary source data on seasonal home spending were available, so an average of $10,000 per household spending was assumed for this category. Summer home population was calculated based upon average California household size. Population labor ratios were calculated based on U.S. Census 200 data on number of people

employed and population. Household size and residents were derived from U.S. Census 2000 data. Jobs, in-commuters, and out-commuters were all calculated by worksheets linked to this worksheet. Working population was calculated based on the number of employed persons times the population/labor ratio shown in the worksheet. Working and non-working population includes the seasonal population and the working population. Other values were derived from U.S. Census 2000 data.

Outputs of Worksheet: The values calculated or shown in this worksheet are used in the fiscal component of the Economic-Fiscal Model and in the MOTHER worksheet.

Data Sources: See "Inputs to Worksheet."

Links to Other Worksheets: This worksheet is linked to the REGION worksheet, the MOTHER worksheet, and to the commuting matrix (Table A-3).

Table A-7. Components of value added (MOTHER Worksheet).

Regional value added
Proprietor's income generated in-region
Earnings generated in region
Percent of earnings claimed by in-commuters
Earning claimed in-region
Profits generated in-region
Percent profits claimed by absentee owners
Profits claimed in region
Profit leakage
Depreciation
Employment
In-commuters
National value added

Source: IMPLAN model (Minnesota IMPLAN Group 2002).

Description: Table A-7 shows a partial list of variables that are computed in the MOTHER worksheet, which is linked to the REGION worksheet and the IMPLAN worksheet. The Table A-7 worksheet takes national data coefficients from the national form and regionalizes them based on data supplied in the REGION worksheet. The regionalized data are transferred from the MOTHER worksheet to the BASE DATA worksheet. These calculations produce regional estimates of value added for all components of value added. Each of these variables is computed for all sectors in the I-O model.

Inputs to Worksheet: The MOTHER worksheet uses coefficients and data from the IMPLAN worksheet and from the REGION worksheet.

Outputs of Worksheet: Data that are calculated by the MOTHER worksheet are supplied to the BASE DATA worksheet.

Data Sources: National coefficients are based on data from the U.S. Department of Commerce, Bureau of Economic Analysis, and from the Minnesota IMPLAN group.

Links to Other Worksheets: The MOTHER worksheet is linked to the BASE DATA and REGION worksheets.

Table A-8. Export calculations (MOTHER Worksheet).

Paradise Model	TRO ($1,000)	Non-Basic Reqt's ($1,000)	SLQ exports ($1,000)	Stevens ($1,000)	Mechanical ($1,000)	Percent Mechanical Export	Override Percent	Final Exports ($1,000)
Sector								
450 Food stores	$26,610	$15,598	$11,792	$11,792	$11,792	44%	44%	$11,792
463 Motels	$851	$9,455	$0	$0	$0	0%	50%	$425

Source: Derived from data from the U.S. Bureau of Economic Analysis and Minnesota IMPLAN Group 2002.

Description: Table A-8 shows a partial list of variables that are computed in the MOTHER worksheet. These calculations are used to develop a regional estimate of exports for each industry. Note that the table includes only two of hundreds of industries in the model; these two sectors are a good example of export calculations. Three mechanical techniques were used to calculate exports. First, non-basic requirements were calculated by a macro, which multiplies total regional output (TRO) by the regionalized technical coefficients or "A" matrix. This produces a column vector of non-basic requirements. These requirements represent the amount of output required to meet the inter-industry demands of the local economy. This estimate is used in the supply-demand pool calculations. The Simple Location Quotient (SLQ) calculation compares TRO in each sector to national output in that sector. If regional output exceeds the national proportion, any excess is assumed to be exported. The Stevens RPC uses an econometric algorithm to estimate regional purchase coefficients for each sector. TRO is multiplied by these coefficients to estimate non-basic requirements, and any excess production is assumed to be exported. The model used the largest of these three estimates of exports as a mechanical estimate. The model also provides the option of overriding manual exports with a survey-based estimate of exports.

Inputs to Worksheet: TRO is calculated for each sector by multiplying employment-by-employment/output ratios supplied by the national worksheet.

Outputs of Worksheet: Data that are calculated by the MOTHER worksheet is supplied to the BASE DATA worksheet and to the REGIONAL A-MATRIX worksheet.

Data Sources: National coefficients are based upon data from the Bureau of Economic Analysis and from the Minnesota IMPLAN Group.

Links to Other Worksheets: Export calculations are used in the BASE DATA worksheet and in calculating the REGIONAL A-MATRIX worksheet.

Table A-9. Personal consumption expenditures, government, and investment (MOTHER Worksheet).

Sources for Personal Consumption Expenditures
Earnings in-region
Profits in-region
Source for state and local government expenditures
Proprietor's income generated in region
Profits in-region
Household share
Business share
Coefficients from household share
Coefficients from business share
Investment coefficients
Export coefficients
Value added coefficients
Personal consumption expenditures coefficients
State and local government coefficients

Source: IMPLAN model (Minnesota IMPLAN Group 2002).

Description: Table A-9 shows a partial list of variables that are computed in the MOTHER worksheet, which is linked to the REGION worksheet and the IMPLAN worksheet. This worksheet takes national data coefficients from the national form and regionalizes them based upon data supplied in the region form. These regionalized data are transferred from the MOTHER worksheet to the BASE DATA worksheet. The purpose of this part of the worksheet is to calculate coefficients, which are used to complete or close the technical coefficients matrix (REGIONAL A-MATRIX). The "A" matrix only includes inter-industry transactions unless these additional variables are included. Variables add household and government transactions to the "A" matrix. These variables are calculated for all sectors in the model.

Inputs to Worksheet: The MOTHER worksheet uses coefficients and data from the IMPLAN worksheet and from the REGION worksheet.

Outputs to Worksheet: Data that are calculated by the MOTHER worksheet are supplied to the BASE DATA worksheet. They are linked by a macro to the REGIONAL A-MATRIX worksheet.

Data Sources: National coefficients are based on data from the Bureau of Economic Analysis and from the Minnesota IMPLAN Group (2002).

Links to Other Worksheets: The MOTHER worksheet is linked to the BASE DATA and REGION worksheets. These coefficients are also linked via a macro to the REGIONAL A-MATRIX worksheet.

Table A-10. Coefficients (IMPLAN Worksheet).

Wage coefficient	0.072451
Proprietors earnings coefficient	0.081941
Indirect business taxes coefficient	0.026772
Profit coefficient	0.131894
Earnings coefficient	0.154392
Depreciation coefficient	0.029159
Value added coefficient	0.342217
Jobs coefficient	14.51382

Source: Internal model calculations based on Bureau of Economic Analysis data.

Description: Table A-10 shows a list of coefficients that are generated by the IMPLAN worksheet. These coefficients are for the agriculture sector, the first of the 528 industrial sectors in the model. The coefficients, which are calculated for all 528 sectors, are generated from national input-output data.

Inputs to Worksheet: The coefficients are calculated by the IMPLAN program using data supplied by the Bureau of Economic Analysis.

Outputs of Worksheet: The coefficients developed in this worksheet are used in the MOTHER worksheet.

Data Sources: All of the data in this worksheet are supplied by the national input-output tables, which are prepared by the Bureau of Economic Analysis.

Links to Other Worksheets: This worksheet is linked to the MOTHER worksheet and is used by this worksheet to calculate components of value added.

Table A-11. National data (MOTHER Worksheet).

Adjusted total gross output	$212,846
Earnings	$15,421
Proprietor's earning plus depreciation	$19,819
Proprietor's income	$17,440
Indirect business taxes	$5,698
Profit plus depreciation	$31,901
Profit plus depreciation	$28,073
Gross earnings	$35,240
Net earnings	$32,861
Depreciation	$6,206
Summed value added	$72,839
Employment	3,089,216

Source: Internal model calculations based on Bureau of Economic Analysis data.

Description: Table A-11 shows a list of national data for the first industrial sector (agriculture) in the model. Data shown are used to produce coefficients such as labor/output ratios. These data are used to calculate coefficients that are used to estimate regional components of value added.

Inputs to Worksheet: Data shown are supplied to the IMPLAN program by the Bureau of Economic Analysis.

Outputs of Worksheet: These data are used to produce coefficients.

Data Sources: All of the data in this worksheet are supplied by the national input-output (IMPLAN worksheet) tables, which are developed by the Bureau of Economic Analysis.

Links to Other Worksheets: Data are used internally by the IMPLAN worksheet.

Table A-12. Adjusted national data (MOTHER Worksheet).

National Basic Data	Adjusted Total Gross Output (millions of $)	Employee Compensation (millions of $)	Adjusted Proprietary Income and Depreciation (millions of $)	Net Proprietary Income (millions of $)
1 Agriculture	$212,847	$15,421	$19,819	$17,441
26 Agricultural, forestry, fishery	$13,905	$6,932	$2,044	$1,798
27 Landscape and horticultural services	$16,865	$9,411	$3,110	$2,737
28 Iron ores	$2,049	$494	$2.8	$2.5
29 Copper ores	$4,449	$917	$5.1	$4.5
30 Lead and zinc ores	$540	$131	$0.7	$0.6
31 Gold ores	$4,748	$1,031	$5.8	$5.0
32 Silver ores	$120	$67.8	$0.4	$0.3
33 Ferroalloy ores except vanadium	$160	$55.1	$0.3	$0.3
34 Metal mining services	$433	$184	$1.0	$0.9
35 Uranium-radium-vanadium ores	$77.0	$49.5	$0.3	$0.2
36 Metal ores not elsewhere classified	$187	$60.9	$0.3	$0.3
37 Coal mining	$26,804	$6,082	$1,551	$1,364
38 Natural gas and crude petroleum	$95,734	$15,240	$4,382	$3,856
39 Natural gas liquids	$10,300	$459	$132	$116
40 Dimension stone	$6,212	$1,832	$181	$159
41 Sand and gravel	$3,763	$1,395	$138	$121
42 Clay, ceramic, refractory miner	$1,648	$354	$35	$31
43 Potash, soda, and borate minerals	$1,653	$337	$33	$29
44 Phosphate rock	$1,101	$187	$18	$16

Note: Adjustments in TGO, PRP and profits were made to eliminate negative income. Consumption element of TGO was reduced by owner occupied dwelling amount.

Source: Internal model calculations using Bureau of Economic Analysis data.

Description: Table A-12 shows national data used by the MOTHER worksheet to compute regional output and components of regional value added.

Inputs to Worksheet: Bureau of Economic Analysis is the source for data used in this worksheet.

Outputs of Worksheet: The data are used in internal model calculations

Data Sources: The data above are values supplied by the Bureau of Economic Analysis from the National Input-Output Accounts.

.**Links to Other Worksheets:** The values in the MOTHER worksheet are used in calculations that are included in the BASE DATA worksheet.

Table A-13. Calculations (BASE DATA Worksheet).

Oroville Model	Total Regional Output ($1,000)	Jobs By Place of Work ($1,000)	Earnings Generated In-region ($1,000)	Earnings Claimed In-region ($1,000)	Profits Generated In-region ($1,000)	Profits Claimed In-region ($1,000)	Deprecia-tion ($1,000)	Value Added ($1,000)
1 Agriculture	$114,719	1368	$17,712	$14,169	$15,131	$0	$3,345	$39,259
26 Agricultural, forestry, fishery	$8,410	474	$5,280	$4,224	$803	$0	$258	$6,651
27 Landscape and horticulture	$1,683	111	$1,212	$970	$264	$0	$73	$1,613
40 Dimension stone	946	5	$303	$243	$198	$99	$30	$561
41 Sand and gravel	268	3	$108	$86	$52	$52	$8	$176
48 New construction	$50,268	757	$17,072	$13,658	$1,588	$1,588	$644	$19,761
55 Maintenance construction	$22,656	439	$10,234	$8,187	$970	$970	$401	$11,705
67 Canned fruits and vegetables	$63,731	287	$11,802	$9,441	$8,872	$0	$1,243	$22,422
68 Dehydrated food products	$3,536	350	$795	$636	$536	$268	$75	$1,433
69 Pickles, sauces	$1,055	5	$131	$105	$269	$269	$37	$446
79 Bread, cake	$2,058	17	$530	$424	$253	$126	$36	$832
89 Animal and marine fats	$2,088	9	$349	$279	$224	$224	$31	$619
93 Wines, brand	$571	3	$85	$68	$57	$57	$8	$260
103 Food preparations, N.E.C	$413	10	$71	$57	$56	$56	$8	$138
133 Logging camps	$12,833	74	$2,159	$1,727	$2,480	$0	$380	$5,094
134 Sawmills and planing mills	$23,103	134	$5,173	$4,139	$1,908	$0	$360	$7,578
137 Millwork	$4,964	67	$1,819	$1,455	$210	$0	$64	$2,123
138 Wood kitchen cabinets	$1,718	23	$661	$529	$167	$84	$36	$875
145 Wood preserving	$5,453	15	$660	$528	$409	$205	$69	$1,166
146 Reconstituted wood products	$12,553	75	$2,250	$1,800	$2,106	$0	$331	$4,761
147 Wood products, N.E.C	$3,750	43	$1,410	$1,128	$391	$195	$81	$1,902
157 Wood partitions and fixtures	$6,698	77	$3,000	$2,400	$245	$0	$57	$3,339

Source: Internal model calculations.

Description: The BASE DATA worksheet is calculated by macros, which are linked to the REGIONAL A-MATRIX worksheet. The data in this worksheet offer a regionalized picture of the study area's economy. All rows of the national I-O model that are not relevant to the study area have been deleted. Base data include all industries that are present in the study area and exclude industries that are not represented in the area.

Inputs to Worksheet: The data shown above are calculated by a macro that uses data from the MOTHER worksheet and coefficients from the IMPLAN worksheet.

Outputs of Worksheet: This worksheet supplies data to the LONG FORM worksheet.

Data Sources: All of the data in this worksheet are supplied by internal calculations. These data are produced by macros.

Links to Other Worksheets: Data from this worksheet are used by the LONG FORM worksheet for its input-output calculations.

Table A-14. Model feed (BASE DATA Worksheet).

Exogenous Titles	Exogenous Base	Model Feed
1 Agriculture	$98,817.8	$98,817.8
26 Agricultural, forestry, fishery	$7,370.9	$7,370.9
27 Landscape and horticultural service	$560.9	$560.9
40 Dimension stone	$482.2	$482.2
41 Sand and gravel	$45.8	$45.8
48 New construction	$10,843.6	$10,843.6
55 Maintenance construction	$3,056.5	$3,056.5
67 Canned fruits and vegetables	$62,632.4	$62,632.4
68 Dehydrated food products	$3,316.2	$3,316.2
69 Pickles, sauces, and salad dressings	$475.8	$475.8
79 Bread, cake, and related products	$407.6	$407.6
89 Animal and marine fats and oils	$1,936.3	$1,936.3
93 Wines, brandy, and brandy spirits	$216.5	$216.5
103 Food preparations, N.E.C	$0	$0
133 Logging camps and logging contractors	$11,579.4	$11,579.4
134 Sawmills and planing mills, gen	$21,175.6	$21,175.6
137 Millwork	$4,131.8	$4,131.8
138 Wood kitchen cabinets	$1,237.6	$1,237.6
145 Wood preserving	$5,180.1	$5,180.1
146 Reconstituted wood products	$12,165.3	$12,165.3
147 Wood products, N.E.C	$3,416.6	$3,416.6
157 Wood partitions and fixtures	$6,412.3	$6,412.3

Source: Internal model calculations.

Description: The model feed part of the BASE DATA worksheet, shown by Table A-14, is used to input changes in final demand to the I-O model. These values are linked to the LONG FORM worksheet, where they are used for the impact assessment. "Exogenous Base" data are calculated by a Gauss (computer programming software) macro and are linked via the macro to the MOTHER worksheet. The model feed shows the exogenous base operating at 100 percent of capacity (baseline model).

Inputs to Worksheet: The model uses data from the MOTHER worksheet and the REGIONAL A-MATRIX worksheet.

Outputs of Worksheet: These data are linked to the LONG FORM worksheet, where it is used for the impact analysis.

Data Sources: The data in this table are calculated by Gauss macros.

Links to Other Worksheets: These data are linked directly to the LONG FORM worksheet and indirectly to the MOTHER worksheet.

Table A-15. Impact analysis (BASE DATA Worksheet).

Oroville Model	Sales ($1,000)	Change ($1,000)	Change	Empl.	Change	Change	Earnings ($1,000)	Change ($1,000)	Change
1 Agriculture	$114,719	$115,048	100%	1,368	1,372	100%	$17,712	$17,763	100%
26 Agricultural, forestry, fishery	$8,410	$8,413	100%	474	474	100%	$5,280	$5,282	100%
27 Landscape services	$1,683	$1,922	114%	111	127	114%	$1,212	$1,384	114%
40 Dimension atone	$946	$1,370	145%	5	8	145%	$303	$439	145%
41 Sand and gravel	$268	$602	225%	3	7	225%	$108	$243	225%
48 New construction	$50,268	$152,155	303%	757	2,292	303%	$17,072	$51,675	303%
55 Maintenance construction	$22,656	$23,510	104%	439	455	104%	$10,234	$10,620	104%
67 Canned fruits and vegetables	$63,731	$63,752	100%	287	287	100%	$11,802	$11,806	100%
68 Dehydrated food products	$3,536	$3,539	100%	35	35	100%	$795	$795	100%
69 Pickles, sauces…	$1,055	$1,084	103%	5	5	103%	$131	$135	103%
79 Bread, cake	$2,058	$2,146	104%	17	18	104%	$530	$553	104%
89 Animal and marine fats	$2,088	$2,088	100%	9	9	100%	$349	$349	100%
93 Wines, brandy	$571	$590	103%	3	4	103%	$85	$88	103%
103 Food preparations, N.E.C	$413	$435	105%	10	10	105%	$71	$74	105%
133 Logging camps	$12,833	$12,855	100%	74	74	100%	$2,159	$2,163	100%
134 Sawmills and planning mills	$23,103	$23,478	102%	134	136	102%	$5,173	$5,257	102%
137 Millwork	$4,964	$6,003	121%	67	81	121%	$1,819	$2,200	121%
138 Wood kitchen cabinets	$1,718	$2,252	131%	23	30	131%	$661	$867	131%
145 Wood preserving	$5,453	$5,784	106%	15	16	106%	$660	$700	106%
146 Reconstituted wood products	$12,553	$12,677	101%	75	76	101%	$2,250	$2,272	101%
147 Wood products, N.E.C	$3,750	$3,792	101%	43	44	101%	$1,410	$1,425	101%
157 Wood partitions and fixtures	$6,698	$6,735	101%	77	77	101%	$3,000	$3,016	101%

Source: Internal model calculations.

Description: This portion of the BASE DATA worksheet, shown by Table A-15, is used for the impact analysis. The table shows three columns each for sales, earnings, and employment. The first column of sales, earnings, and employment is linked to baseline values shown in Table A-16. The second column of each variable (sales change, earning change, employment change), is calculated by multiplying changes in final demand entered in the LONG FORM worksheet by the multiplier matrix.

Inputs to Worksheet: This worksheet uses values from the REGIONAL MULTIPLIER MATRIX worksheet and LONG FORM worksheet.

Outputs of Worksheet: The values computed in this worksheet link back to the LONG FORM worksheet and to an aggregation template in another part of the BASE DATA worksheet.

Data Sources: The model computes all of the values in this worksheet.

Links to Other Worksheets: This worksheet in linked to other values in the BASE DATA worksheet, the LONG FORM worksheet, and the REGIONAL MULTIPLIER MATRIX worksheet.

Table A-16. Aggregated impact results (BASE DATA Worksheet).

Paradise Model	Sales ($1,000)	Sales Change ($1,000)	Percent Change	Jobs	Jobs Change	Percent Change	Earnings ($1,000)	Earnings Change ($1,000)	Percent Change	Value Added ($1,000)
Agriculture	$61,022	$60	0%	558	2	0%	$16,999	$27	0%	$25,226
Construction	$58,900	$976	2%	934	16	2%	$21,433	$360	2%	$24,160
Manufacturing	$22,837	$98	0%	137	1		$4,772	$24		$8,051
Transportation	$1,746	$44	3%	30	1	3%	$564	$14	3%	$765
Utilities	$11,370	$178	2%	30	0	1%	$1,844	$27	1%	$5,763
Communications	$5,990	$90	2%	114	3	3%	$1,548	$26	2%	$2,898
Trade	$60,987	$465	1%	1544	11	1%	$32,572	$233	1%	$51,505
Fire	$44,229	$671	2%	484	8	2%	$9,862	$133	1%	$29,415
Hospitality services	$21,807	$18,569	85%	883	693	78%	$8,574	$7,150	83%	$12,036
Consumer services	$20,856	$381	2%	736	15	2%	$11,475	$251	2%	$14,394
Business services	$9,602	$300	3%	308	11	3%	$5,290	$179	3%	$6,104
Social services	$112,328	$787	1%	3171	19	1%	$63,402	$439	1%	$68,343
Federal government	$10,009	$0	0%	195	0	0%	$7,870	$0	0%	$7,890
State/Local government	$142,524	$1,355	1%	2413	25	1%	$89,296	$903	1%	$91,326
Consumption	$734,474	$6,108	1%	0	0	0%	$0	$0	0%	$0
TOTAL	$1,318,681	$30,082	2%	11536	804	7%	$275,500	$9,767	4%	$347,875

Source: Internal model calculations.

Description: This table presents results of the analysis in an aggregated form. The outputs of this table are linked directly to the SHORT FORM worksheet, where they are used for graphing and presentation. (The LONG FORM presentation of results is too long and complicated for presentation purposes.) The impact run presented in this table shows the results of a 100 percent increase (doubling) of the sales of the eating and drinking establishments sector in Paradise. It shows that this change would have a 2 percent overall effect on sales, a 7 percent increase on jobs (804 new jobs), and a 7 percent increase in earnings.

Inputs to Worksheet: This worksheet aggregates data from another section of the BASE DATA worksheet.

Outputs of Worksheet: The values computed in this worksheet link to the SHORT FORM worksheet.

Data Sources: The model internally calculates all of the information in this worksheet.

Links to Other Worksheets: This worksheet is linked to the SHORT FORM worksheet.

Table A-17. Input-output structure (REGIONAL A-MATRIX).

	1 Agriculture	26 Agricultural	27 Landscape	40 Stone	41 Sand	48 Construction	55 M.Construction
1 Agriculture	7.2401%	2.2093%	1.1323%	0.0000%	0.0000%	0.1581%	0.1655%
26 Agricultural, forestry, fishery	0.8899%	0.0503%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
27 Landscape and horticultural	0.0075%	0.0000%	0.0000%	0.0350%	0.0345%	0.2180%	0.2399%
40 Dimension stone	0.1120%	0.0005%	0.0000%	0.5241%	0.1497%	0.3711%	0.5256%
41 Sand and gravel	0.0018%	0.0002%	0.0000%	0.3689%	1.1772%	0.2069%	0.1351%
48 New construction	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0046%	0.0000%
55 Maintenance construction	0.8846%	0.3715%	0.0354%	0.1117%	0.2998%	0.0394%	0.0395%

Source: Internal model calculations.

Description: The REGIONAL A-MATRIX is a large matrix that shows the input and output structures of every industry in the model area's economy. (This table shows a small part of the Paradise Model REGIONAL A-MATRIX.) The columns show what is essentially the "production recipe" for an industry. For example, it shows that for every dollar of agricultural production, agriculture buys 7.2 percent of its inputs from the agriculture sector and 0.1 percent of its inputs from the dimension stone sector. The rows show the sectors to which each industry sells its products. For example, the agriculture sector sells 1.1 percent of its output to landscape and horticultural services sector. (Normally, the matrix is shown in coefficient form; it is converted here to percentages for ease of understanding, so very small values appear as zeros.)

Inputs to Worksheet: The values in this worksheet are calculated by regionalizing the NATIONAL A-MATRIX. This is done by deleting row and columns of the national matrix for industries that are not present in the study area. The resulting regional matrix is then scaled to accommodate exports. If a regional industry exports more than the national average, regional exports are adjusted upwards. If a regional industry exports less than the national average, regional industry absorption is scaled up to absorb more output in the region.

Outputs of Worksheet: This matrix in this table is used to form the REGIONAL MUILTIPLIER MATRIX worksheet.

Data Sources: All of the information in the matrix is formed by internal model calculations.

Links to Other Worksheets: This worksheet is linked to the REGIONAL MULTIPLIER MATRIX worksheet by a macro that inverts the values in the REGIONAL A-MATRIX worksheet.

Table A-18. Multipliers (REGIONAL MULTIPLIER MATRIX Worksheet).

Oroville Model	1	26	27	40	41	48
TYPE I	1.4043	1.7638	1.8237	1.6144	1.8038	1.6998
TYPE II	1.6558	2.2741	2.4256	2.0112	2.2528	2.0155
1 Agriculture	1.0790	0.0258	0.0144	0.0015	0.0020	0.0033
26 Agricultural, forestry	0.0096	1.0007	0.0001	0.0000	0.0000	0.0000
27 Landscape services.	0.0003	0.0002	1.0003	0.0005	0.0006	0.0024
40 Dimension stone	0.0014	0.0002	0.0002	1.0054	0.0017	0.0042
41 Sand and gravel	0.0001	0.0001	0.0001	0.0039	1.0121	0.0033
48 New construction	0.014994	0.030427	0.035894	0.023667	0.026777	1.0189

Source: Internal model calculations.

Description: The REGIONAL MULTIPLIER MATRIX worksheet (Table A-18) is created by inverting the regional "A" matrix ($I-A^{-1}$). The table above shows a small portion of the REGIONAL MULTIPLIER MATRIX worksheet, which is a large matrix with rows and columns for every industry in the study area. By adding the columns of the

matrix in the worksheet, the multipliers for any sector of the economy can be checked. The example above shows that agriculture has a lower multiplier than landscape services. The table also shows that the induced (TYPE II) effect is much greater for landscape services than for agriculture. This is because landscape services are very labor intensive, and agriculture is more mechanized.

Inputs to Worksheet: The REGIONAL MULTIPLIER MATRIX worksheet is linked to the REGIONAL A-MATRIX worksheet.

Outputs of Worksheet: The REGIONAL MULTIPLIER MATRIX worksheet is used to calculate economic impacts. The results of these calculations are shown in BASE DATA and LONG FORM worksheets.

Data Sources: Values in the REGIONAL MULTIPLIER MATRIX worksheet are generated by calculations internal to the model.

Links to Other Worksheets: The REGIONAL A-MATRIX worksheet provides inputs to the REGIONAL MULTIPLIER MATRIX worksheet; the REGIONAL MULTIPLIER MATRIX worksheet provides outputs to the BASE DATA and LONG FORM worksheets.

Table A-19. Impact analysis (LONG FORM Worksheet).

Oroville Model	Changes In Final Demand ($1,000)	Exogenous Base ($1,000)
1 Agriculture	$0	$33,769
26 Agricultural, forestry, and fisheries	$0	$8,813
27 Landscape and horticultural services	$300	$2,311
40 Dimension stone	$500	$61,064
41 Sand and gravel	$500	$45
48 New construction	$2,500	$1,059
55 Maintenance construction	$1,200	$19,255

Source: Internal model calculations.

Description: The LONG FROM worksheet (Table A-19) is used to conduct the impact analysis. (Note: this worksheet is the only worksheet in the final version of the I-O model that is intended for inputting data for the impact analysis.) Users input changes in final demand to this worksheet and the model calculates the direct, indirect, and induced changes in sales, earnings, and employment that result from those changes. The second column shown above (exogenous base) shows the baseline condition. In the example shown, all sectors are running at baseline except for the new construction sector. A $7.0 million construction project at the Oroville Facilities shows an increase of $5.0 million in final demand in the Oroville Model Area. (Note: all values in the LONG FORM worksheet are expressed in thousands of dollars.)

Inputs to Worksheet: This portion of the LONG FORM worksheet relies on user-derived inputs. The model user inputs a change in final demand and the model calculates the resulting impact on the economy. "Exogenous base" values area calculated by the MOTHER worksheet based on export estimates.

Outputs of Worksheet: The results of changes in final demand are displayed in another section of the LONG FORM worksheet.

Data Sources: Inputs to the worksheet are estimates of changes in final demand developed by the model user. Outputs are generated by internal model calculations.

Links to Other Worksheets: Changes in final demand are multiplied by the REGIONAL MULTIPLIER MATRIX worksheet, and the results are linked to the BASE DATA worksheet and to another section of this worksheet.

Table A-20. Impact analysis results (LONG FORM Worksheet).

Oroville Model	Sales ($1,000)	Sales Change ($1,000)	Percentage Change	Earnings ($1,000)	Earnings Change ($1,000)	Percentage Change
1 Agriculture	$48,820.5	$61	0.1%	$11,622.0	$15	0.1%
26 Agricultural, forestry, fishery	$11,970.3	$4	0.0%	$5,688.0	$2	0.0%
27 Landscape and horticultural services	$3,049.8	$310	10.2%	$1,186.8	$121	10.2%
41 Sand and gravel	$1,270.3	$514	40.5%	$512.9	$208	40.5%
48 New construction	$60,984.2	$2,497	4.1%	$17,577.2	$720	4.1%
55 Maintenance construction	$20,591.7	$1,204	5.8%	$10,097.0	$590	5.8%
67 Canned Fruits and vegetables	$29,146.0	$5	0.0%	$5,166.0	$1	0.0%
68 Dehydrated food products	$3,130.5	$0	0.0%	$646.0	$0	0.0%
79 Bread, cake, and related products	$1,669.6	$4	0.2%	$374.0	$1	0.2%
93 Wines, brandy, and brandy spirits	$420.0	$1	0.3%	$68.6	$0	0.3%
103 Food preparations, N.E.C	$780.1	$2	0.3%	$160.0	$0	0.3%
130 Automotive and apparel trimming	$154.3	$0	0.1%	$31.8	$0	0.1%
133 Logging camps and logging contractors	$9,501.1	$8	0.1%	$2,220.4	$2	0.1%
134 Sawmills and planing mills	$17,488.7	$35	0.2%	$3,811.5	$8	0.2%
135 Hardwood dimension and flooring	$194.5	$4	1.9%	$72.4	$1	1.9%

Table A-20. Impact analysis results (LONG FORM Worksheet, continued.

Oroville Model	Employment	Employment Change	Percentage Change
1 Agriculture	894.0	1	0.1%
26 Agricultural, forestry, fishery	474.0	0	0.0%
27 Landscape and horticultural services	111.0	11	10.2%
41 Sand and gravel	33.9	14	40.5%
48 New construction	780.6	32	4.1%
55 Maintenance construction	438.6	26	5.8%
67 Canned fruits and vegetables	287.0	0	0.0%
68 Dehydrated food products	35.0	0	0.0%
79 Bread, cake, and related products	17.0	0	0.2%
93 Wines, brandy, and brandy spirits	3.0	0	0.3%
103 Food preparations, N.E.C	10.0	0	0.3%
130 Automotive and apparel trimming	5.8	0	0.1%
133 Logging camps and logging contractors	74.0	0	0.1%
134 Sawmills and planing mills	134.1	0	0.2%
135 Hardwood dimension and flooring	2.3	0	1.9%

Source: Internal model calculations.

Description: The impacts resulting from changes in final demand are displayed in the section of the LONG FORM worksheet included in Table A-20. These impacts include changes in sales, earnings, and employment.

Inputs to Worksheet: The results shown in Table A-20 are linked to the changes in final demand shown in Table A-19 and to the REGIONAL MULTIPLIER MATRIX worksheet.

Outputs of Worksheet: The information in the table above is aggregated in the SHORT FORM worksheet for presentation purposes.

Data Sources: The model internally calculates all of the information shown in Table A-20.

Links to Other Worksheets: The impacts from this worksheet are aggregated into the SHORT FORM worksheet**.**

Table A-21. Impact results (SHORT FORM Worksheet).

Oroville Model	Sales ($1,000)	Sales Change ($1,000)	Earnings ($1,000)	Earnings Change ($1,000)	Percentage Change
Industrial Sector					
Agriculture and agricultural services	$67,515	$389	$20,235	$144	0.7%
Mining, sand, and gravel	$1,270	$514	$513	$208	40.5%
Construction	$81,576	$3,700	$27,674	$1,310	4.7%
Manufacturing: food/wood and paper/textiles	$66,481	$98	$13,564	$25	0.2%
Manufacturing: chemicals/petroleum/stone and glass	$27,401	$36	$6,932	$11	0.2%
Manufacturing: computer and electronic equipment	$844	$0	$269	$0	0.0%
Manufacturing: other	$9,234	$3	$2,291	$1	0.0%
Transportation	$19,663	$120	$7,446	$40	0.5%
Public utilities	$10,384	$39	$2,526	$9	0.4%
Publishing and communications	$10,803	$39	$3,189	$11	0.3%
Trade	$99,285	$592	$47,035	$271	0.6%
Finance, insurance, and real estate	$40,763	$179	$9,242	$39	0.4%
Motels and eating/drinking and amusement/recreation	$77,276	$115	$32,249	$46	0.1%
Consumer services	$23,693	$92	$11,134	$41	0.4%
Business services	$16,939	$131	$9,280	$66	0.7%
Medical/educational/social services	$86,318	$229	$48,561	$126	0.3%
Federal government	$16,562	$0	$13,076	$0	0.0%
State and local government	$199,308	$610	$124,355	$406	0.3%
TOTAL	$855,313	$6,887	$379,573	$2,752	0.7%

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Table A-21. Impact results (SHORT FORM Worksheet),continued.

Oroville Model	Employment	Employment Change	Percentage Change
Industrial Sector			
Agriculture and agricultural services	1,612	13	0.8%
Mining, sand, and gravel	34	14	40.5%
Construction	1,219	58	4.7%
Manufacturing: food/wood and paper/textiles	612	1	0.2%
Manufacturing: chemicals/petroleum/stone and glass	279	0	0.2%
Manufacturing: computer and electronic equipment	6	0	0.0%
Manufacturing: other	88	0	0.0%
Transportation	346	2	0.6%
Public utilities	54	0	0.4%
Publishing and communications	135	0	0.3%
Trade	2,274	12	0.5%
Finance, insurance, and real estate	300	1	0.4%
Motels and eating/drinking and amusement/recreation	1,963	4	0.2%
Consumer services	623	2	0.4%
Business services	447	3	0.6%
Medical/educational/social services	3,899	9	0.2%
Federal government	331	0	0.0%
State and local government	3,794	13	0.3%
TOTAL	18,014	132	0.7%

Source: Internal model calculations.

Table A-22. SIC Code aggregation results (SHORT FORM Worksheet).

Oroville Model Short Form	Sales ($1,000)	Sales Change ($1,000)	Earnings ($1,000)	Earnings Change ($1,000)	Percentage Change
Standard Industrial Classification					
Agriculture	$67,515	$389	$20,235	$144	0.7%
Construction	$82,846	$4,215	$28,187	$1,517	5.4%
Manufacturing	$103,960	$138	$23,057	$36	0.2%
TCU	$40,849	$198	$13,162	$60	0.5%
Trade	$99,285	$592	$47,035	$271	0.6%
Fire	$40,763	$179	$9,242	$39	0.4%
Hospitality	$77,276	$115	$32,249	$46	0.1%
Services	$126,950	$452	$68,975	$233	0.3%
Government	$215,870	$610	$137,431	$406	0.3%
TOTAL	$855,313	$6,887	$379,573	$2,752	0.7%

Table A-22 SIC Code aggregation results (SHORT FORM Worksheet), continued.

Oroville Model Short Form	Employment	Employment Change	Percentage Change
Standard Industrial Classification			
Agriculture	1,612	13	0.8%
Construction	1,253	71	5.7%
Manufacturing	984	0	0%
TCU	535	3	0.5%
Trade	2,274	12	0.5%
Fire	300	1	0.4%
Hospitality	1,963	4	0.2%
Services	4,969	14	0.3%
Government	4,125	13	0.3%
TOTAL	18,014	131	0.7%

Source: Internal model calculations

Description: The SHORT FORM worksheet (Table A-21) summarizes the impact results shown in the LONG FORM worksheet. The SHORT FORM worksheet aggregates impacts for the 528 sector input-output model into an 18-sector worksheet. The 18-sector sheet is further aggregated into a 9-sector SIC code (or NICS) scheme for presentation. This aggregation is shown by Table A-22.

Inputs to Worksheet: Inputs to the SHORT FORM worksheet come from the LONG FORM worksheet (Table A-21).

Outputs of Worksheet: The impacts aggregated in the SHORT FORM worksheets for all of the community-level model areas are summarized in the IMPACT SUMMARY worksheet.

Data Sources: The LONG FORM worksheet supplies all of the information aggregated in the SHORT FORM worksheet.

Links to Other Worksheets: The SHORT FORM worksheet is linked to the LONG FORM worksheet and the IMPACT SUMMARY worksheet.

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Table A-23. Model results (IMPACT SUMMARY Worksheet).

Impact Summary Worksheet	Butte County Jobs	Butte County Earnings ($1,000)	Oroville Jobs	Oroville Earnings ($1,000)
Model Sectors (Short Form)				
Agriculture and agricultural services	23	$256.530	13	$143.750
Mining, sand, and gravel	0	$207.587	14	$207.587
Construction	81	$1,843.794	58	$1,309.823
Manufacturing: food/wood and paper/textiles	3	$81.083	1	$24.914
Manufacturing: chemicals/petroleum, stone and glass	10	$242.745	0	$10.535
Manufacturing: computer and electronic equipment	0	$6.856	0	$0.092
Manufacturing: other	0	$15.016	0	$0.784
Transportation	5	$113.553	2	$40.068
Public utilities	1	$33.968	0	$9.370
Publishing and communications	2	$74.097	0	$10.960
Trade	29	$638.791	12	$270.949
Finance, insurance, and real estate	6	$161.276	1	$38.519
Motels and eating/drinking and amusement/recreation	14	$150.368	4	$45.740
Consumer services	13	$231.704	2	$40.635
Business services	13	$298.106	3	$65.779
Medical/educational/social services	23	$458.235	9	$126.422
Federal government	0	$20.062	0	$0.000
State and local government	38	$1,203.396	13	$406.464
TOTALS	262	$6,037.167	132	$2,752.391

Source: Internal model calculations.

Description: The IMPACT SUMMARY worksheet (Table A-23) shows, in summary form, the results of impact runs for all five community-level models. (Note: this table only shows jobs and earnings impacts for Butte County and the Oroville model area; in practice, this worksheet also shows results for the Biggs-Gridley, Chico, and Paradise model areas.)

Inputs to Worksheet: The IMPACT SUMMARY worksheet is linked to the SHORT FORM worksheets for all community-level model areas.

Outputs of Worksheet: For presentation purposes, the information in the IMPACT SUMMARY worksheet is aggregated in the SHORT FORM worksheet.

Data Sources: The impacts shown by the worksheet are generated by internal model calculations based on changes in final demand.

Links to Other Worksheets: The IMPACT SUMMARY worksheet is linked to the SHORT FORM worksheets for each of the community-level models.

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APPENDIX B

Data Processing Procedures and Results of Developing Visitor Spending Profiles

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DATA PROCESSING PROCEDURES AND RESULTS OF DEVELOPING VISITOR SPENDING PROFILES

The methodology for developing the recreation spending profiles used in the economic impact modeling for the Oroville Facilities relicensing process consists of a series of steps followed to process the expenditure data obtained from mail-back surveys and to convert them into units needed as inputs to the economic impact model. Each of the steps is described below.

STEP 1: PROCESS AND ENTER DATA FROM MAIL-BACK SURVEYS

Participants in the on-site recreation surveys were asked to complete a follow-up survey that was administered by mail and that included questions about spending during their most recent trip to the Oroville Facilities. A slightly different survey form was used for participants who lived in Butte County (residents) versus out-of-County residents (nonresidents). Spending data identified in the returned surveys (see Part C of the mail-back survey) were entered into a Microsoft Access database that was ultimately converted to SPSS files used to develop the spending profiles. Separate SPSS files were created for residents and nonresidents. Overall, the response rate for the mail-back survey was about 40 percent, with a sample size of a 560 resident surveys and 508 nonresident surveys.

STEP 2: REASSIGN SELECT OBSERVATIONS TO THE APPROPRIATE RESIDENT/NONRESIDENT DATABASE

Several responses in the resident and nonresident databases were placed in the wrong database and were reassigned to the other database (i.e., reassign resident observations to the nonresident database, and vice-versa). The databases were screened based on the ZIP Code of the primary residence address. These ZIP Codes were used to re-assign surveys to the appropriate database.

STEP 3: ASSIGN RESIDENT SURVEYS TO THE APPROPRIATE MODEL AREA

Surveys in the resident database were assigned to one of the four model areas (Oroville Model Area, Chico Model Area, Paradise Model Area, and Biggs-Gridley Model Area) developed for the community-level economic impact assessment. This was necessary so that “at-home” expenditures could be assigned to the appropriate model area where they occurred. The assignment of spending data to a particular model area was based on the ZIP Code identified by survey participants when they provided information on their mailing address during the on-site surveys. All of the resident surveys were assigned to one of the four model areas.

STEP 4A: REFINE MAIL-BACK DATASETS ("DATA CLEANING") - SCREEN DATASETS BASED ON MISSING/NON-INTUITIVE DATA FOR CRITICAL VARIABLES

The first phase of the data cleaning process involved reviewing the raw datasets and screening for missing or non-intuitive values for two variables critical to the analysis – *Number of People Paid For* and *Number of Days Visited*. These variables are critical because the expenditure profiles are intended to represent average spending *per person per day* estimates. All observations that contained missing or non-intuitive values for both of these variables were deleted from the datasets. Observations that only had missing/non-intuitive data values for either *Number of People Paid For* or *Number of Days Visited* were reviewed individually to determine if estimated values could be substituted for the missing values based on information provided in the on-site survey.

In the case of missing data for *Number of People Paid For*, Question #6 (*How many People in Your Group?*) in the onsite survey was checked and used as a proxy for *Number of People Paid For*. Where the respondent answered "1," "2," or "3" in Question #6, the same response was entered in the mail-back dataset, and where the respondent answered "4" or more, the mean group size for residents and nonresidents, respectively, was used.

In the case of missing values for *Number of Days Visited*, Question #9 (*Are You Staying Overnight in Butte County?*) in the on-site survey was reviewed and used as a proxy for *Number of Days Visited*. Where the respondent stated that they did not stay overnight, or if no response was provided in the on-site survey and no lodging-type expenditures were provided in the mail-back survey, a value of "1" day was entered in the mail-back databases. For those respondents who stated that they did stay overnight and/or had lodging expenditures, they were assigned the mean value of number of days spent in the study area for overnight resident and nonresident visitors, respectively.

STEP 4B: REFINE MAIL-BACK DATASETS ("DATA CLEANING") - SCREEN DATASETS BASED ON OUTLIERS

Using the interim datasets for residents and nonresidents developed as described above, preliminary average spending per person per day estimates for *each* primary recreation site were developed. The primary recreation sites analyzed include: Lake Oroville, Feather River-Diversion Pool, Thermalito Forebay, Thermalito Afterbay, and the OWA (which includes the Clay Pit State SVRA). The total spending estimates (i.e., the sum of all spending across each expenditure category) for each observation were divided by the number of people paid for and number of days spent on the trip to calculate average daily expenditures. A set of descriptive statistics was then developed for each recreation site, which provided the mean and standard deviation (or range) of the preliminary estimates. All observations that fell outside of *two* standard deviations from the mean value were considered "outliers." These outliers were subject to hard-copy review of the mail-back survey questionnaire to determine their appropriateness for inclusion in the datasets (see Step 4D, below).

STEP 4C: REFINE MAIL-BACK DATASETS ("DATA CLEANING") - SCREEN DATASETS BASED ON OBSERVATION WITH NO EXPENDITURES

A significant number of the mail-back surveys had no expenditures reported. This was fairly common for day-users to the Oroville Facilities, but also included people who stated that they stayed overnight during their recent visit. To determine whether these respondents actually spent no money on their visit or if they elected not to fill out the expenditure portion of the mail-back survey, the completed survey forms were reviewed. All observations with no expenditures recorded were flagged and the survey forms were reviewed to determine the appropriateness of their response (or lack of response) for inclusion in the datasets (see Step 4D below).

STEP 4D: REFINE MAIL-BACK DATASETS ("DATA CLEANING") - FIRST REVIEW OF MAIL-BACK SURVEY FORMS

As indicated above, those survey forms with data identified as "outliers" or that had no reported expenditures were reviewed. The survey forms were initially reviewed to determine whether stated expenditures were reasonable based the types of activities that they participated in and on notes provided by the respondent in the surveys. In certain cases, data entry errors were found and corrected. In addition, some respondents provided annual expenditure information, which was either deleted from the databases because it was not a trip-related expense (e.g., purchase of a new motor home) or was annualized (e.g., fishing license) based on the number of reported trips. The end product of this initial review was a revised resident and nonresident expenditure dataset.

STEP 4E: REFINE MAIL-BACK DATASETS ("DATA CLEANING") - SUBSEQUENT REVIEW OF COMPLETED MAIL-BACK SURVEY FORMS

Based on the revised datasets, Steps 4B and 4D were repeated for further refinement to the data. Observations that were not intuitively plausible were deleted. This process resulted in final recreation expenditure datasets for residents and nonresidents, organized by recreation site. The number of observations in the final dataset for Butte County residents is 480 and the number of observations in the final data set for nonresidents of Butte County is 484 (Tables B-1 and B-2, respectively). Tables B-1 and B-2 also show calculations of the minimum and maximum values reported in the completed surveys, and mean values and the standard deviation of the means. Because the datasets were further manipulated to derive average values by model area, descriptive statistics can only be derived directly from the observations at this stage of data processing.

Table B-1. Descriptive statistics for expenditure data in the final dataset for Butte County residents.

Site	Number of Obs.	Min.	Max.	Mean	Std. Dev.
Oroville	268	$0	$283.00	$39.29	$46.60
Feather River/ Diversion Pool	49	$0	$200.83	$23.77	$38.22
Forebay	71	$0	$335.00	$32.25	$49.81
Afterbay	61	$0	$206.50	$35.58	$35.03
OWA	31	$0	$174.50	$40.78	$51.04

Note: The total number of observations is 480. The weighted estimate of the mean is $36.29 and the confidence interval at the 95 percent level of expected likelihood is $32.26 (lower) and $40.32 (upper).
Source: Derived from data collected in mail-back surveys as part of Relicensing Study R-13 – Recreation Surveys.

Table B-2. Descriptive statistics for in-County expenditure data in the final dataset for nonresidents of Butte County.

Site	Number of Obs.	Min.	Max.	Mean	Std. Dev.
Oroville	312	$0	$268.21	$20.16	$31.28
Feather River / Diversion Pool	27	$0	$139.20	$22.76	$32.01
Forebay	19	$0	$100.50	$14.80	$22.85
Afterbay	43	$0	$82.70	$11.93	$21.68
OWA	83	$0	$340.00	$42.08	$59.76

Note: The total number of observations is 484. The weighted estimate of the mean is $23.12 and the confidence interval at the 95 percent level of expected likelihood is $20.00 (lower) and $26.24 (upper).

Source: Derived from data collected in mail-back surveys as part of Relicensing Study R-13 – Recreation Surveys.

STEP 5A: DEVELOP RECREATION EXPENDITURE PROFILES - AVERAGE EXPENDITURES PER EXPENDITURE CATEGORY

Once the final datasets were developed, the data needed to be transformed and organized into a form that could be used as inputs into the community-level economic impact models. The first step in this process was to develop average spending per person per day estimates for each of the 23 distinct expenditure categories contained in the mail-back survey. This was done by dividing each expenditure category value for each observation by the number of people paid for and number of days of the trip.

STEP 5B: DEVELOP RECREATION EXPENDITURE PROFILES – AVERAGE OF THE AVERAGE EXPENDITURES PER EXPENDITURE CATEGORY

The final expenditure profiles are based on applicable averages of average expenditures for each observation. In the case of the nonresident dataset, this exercise is conceptually straightforward in that *all* of the observations were used in calculating average expenditure totals by category for the entire dataset. However, in the case of the resident dataset, local spending (i.e., people spending within their own model area) versus nonlocal spending (i.e., people from one model area spending in another model area) needed to be considered. Consequently, the calculation of average expenditure totals by category for residents was broken down into local and nonlocal spending, with

only local observations used in the local spending averages and nonlocal observations used in the nonlocal averages.

STEP 5C: DEVELOP RECREATION EXPENDITURE PROFILES – PROPORTIONING OF EXPENDITURES "ELSEWHERE IN BUTTE COUNTY"

The mail-back survey included a set of expenditure categories for a location referred to as "Elsewhere in Butte County." This unspecified location was intended to capture expenditures that respondents believed were not made in the communities in Butte County identified in the survey. These reported expenditures were assigned to one of the four model areas based on spending patterns reported in the surveys. More specifically, in the case of the nonresidents, the "Elsewhere in Butte County" expenditures were assigned to one of the four model areas based on the proportion of spending in these model areas, as identified by the respondent in the survey. For example, if a nonresident visitor reported spending 70 percent of his/her total expenditures (excluding the "elsewhere" expenditures) in the Oroville area, then 70 percent of their "Elsewhere in Butte County" expenditures also were assigned to the Oroville area. In the case of residents, the same fundamental approach was used; however, the calculations distinguished between local (residents of a model area) and nonlocal spending.

STEP 5D: DEVELOP RECREATION EXPENDITURE PROFILES – LOCAL VS. NONLOCAL SPENDING

The structure of expenditure profiles varies for residents and nonresidents. For nonresidents, only expenditures made within Butte County are considered in the economic impact models; therefore, expenditure data related to trip preparation and travel are excluded from the expenditure profiles. The nonresident expenditure profiles are represented by one set of spending data that are inputs to the Butte County economy. For residents, expenditure data distinguish between local and nonlocal spending (see definition under Step 5B), and thus two separate sets of spending data were developed for the resident expenditure profiles – one for locals and a second for nonlocals.

STEP 5E: DEVELOP RECREATION EXPENDITURE PROFILES – ASSIGNING AND GROUPING EXPENDITURES INTO APPROPRIATE MODEL INPUT CATEGORIES (FINAL EXPENDITURE PROFILES)

The community-level economic impact models are structured based on a set of industry (or business sector) classifications that serve as inputs to the models. Because these sectors do not necessarily "match" the expenditure categories used in the mail-back survey, the expenditure categories used in the survey were assigned to one of the sectors, as described in Table B-3. Expenditure estimates for the same model sector were subsequently grouped (or added) together to develop expenditure estimates by model sector; the grouped data represent the finalized expenditure profiles used for this project. The final expenditure profiles used in the economic impact models are presented in Tables B-4 through B-14. Expenditure profiles for nonresidents are in

Tables B-4 through B-8 and expenditure profiles for residents (both locals and nonlocals) are in B-9 through B-13.

Table B-3. Cross-reference between expenditure categories and model sectors

Expenditure Category	Model Sector
Lodging	
Hotel/motels/inns	Lodging
Rental homes	Lodging
Camping	Amusement and recreation services
Other lodging	Amusement and recreation services
Food and Beverage	
Purchased at food stores	Food stores
Purchased at restaurants	Eating and drinking establishments
Transportation	
Vehicle rental	Auto dealers and service stations
Vehicle gas and oil	Auto dealers and service stations
Vehicle repair/service	Auto dealers and service stations
Parking fees and tolls	Automobile parking and carwashes
Boat gas and oil	Auto dealers and service stations
Boat repair and service	Miscellaneous repair services
Bus fares	Local government
Other (e.g., air, train, and boat fares other than fishing charters)	Amusement and recreation services
Activities/Entertainment	
Fishing/hunting licenses	State government
Fishing: boat charters	Amusement and recreation services
Fishing/hunting: bait, supplies, equipment	Miscellaneous retail
Other recreation equipment purchased for trip (e.g., tents, sleeping bags, sporting equipment)	Miscellaneous retail
Miscellaneous Spending	
Film purchases/developing	Miscellaneous retail
Clothing	Apparel and accessory stores
Souvenirs/gifts	Miscellaneous retail
Personal services	Other business services
Other	Miscellaneous retail

Source: Developed by study team based on information in the mail-back survey and the economic impact models.

Table B-4. Average nonresident spending per visitor day to the Afterbay by model area.

Model Area	Average Spending per Day	Spending by Sector[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$11.31	$2.49	$1.54	$2.77	$0.98	$0.60	$1.36	$0.00	$0.81	$0.00	$0.59	$0.09	$0.07
Paradise MA	$0.10	$0.00	$0.01	$0.08	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$0.53	$0.00	$0.07	$0.04	$0.40	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TOTAL	**$11.93**	**$2.49**	**$1.63**	**$2.89**	**$1.38**	**$0.60**	**$1.37**	**$0.0**	**$0.81**	**$0.00**	**$0.60**	**$0.09**	**$0.07**

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area.*

Source: Derived from mail-back survey data.

Table B-5. Average nonresident spending per visitor day to the Forebay by model area.

Model Area	Average Spending per Day	Spending by Sector[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$11.09	$2.59	$2.56	$1.40	$0.80	$0.83	$2.20	$0.33	$0.00	$0.00	$0.00	$0.16	$0.21
Paradise MA	$2.13	$0.35	$1.12	$0.12	$0.37	$0.00	$0.16	$0.01	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$0.82	$0.05	$0.19	$0.13	$0.04	$0.00	$0.42	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$0.73	$0.06	$0.17	$0.10	$0.28	$0.00	$0.13	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TOTAL	**$14.80**	**$3.05**	**4.04$**	**$1.76**	**$1.48**	**$0.81**	**$2.92**	**$0.34**	**$0.00**	**$0.00**	**$0.00**	**$0.16**	**$0.21**

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area*

Source: Derived from mail-back survey data.

Table B-6. Average nonresident spending per visitor day to the Feather River – Diversion Pool by model area.

Model Area	Average Spending per Day	Spending by Sector[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$17.78	$4.21	$2.13	$2.14	$2.81	$1.55	$4.51	$0.05	$0.00	$0.00	$0.00	$0.38	$0.00
Paradise MA	$4.24	$3.15	$0.00	$0.20	$0.00	$0.00	$0.89	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$0.74	$0.00	$0.00	$0.00	$0.74	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TOTAL	**$22.76**	**$7.36**	**$2.13**	**$2.35**	**$3.55**	**$1.55**	**$5.40**	**$0.05**	**$0.00**	**$0.00**	**$0.00**	**$0.38**	**$0.00**

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area*

Source: Derived from mail-back survey data.

Table B-7. Average nonresident spending per visitor day to Lake Oroville (reservoir only) by model area.

Model Area	Average Spending per Day	Spending by Sector[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$17.71	$4.07	$0.76	$5.15	$1.81	$3.48	$1.40	$0.20	$0.23	$0.00	$0.07	$0.47	$0.11
Paradise MA	$1.26	$0.18	$0.26	$0.33	$0.10	$0.13	$0.20	$0.02	$0.00	$0.00	$0.01	$0.01	$0.03
Biggs-Gridley MA	$0.40	$0.04	$0.00	$0.02	$0.31	$0.02	$0.00	$0.00	$0.00	$0.00	$0.00	$0.01	$0.00
Chico MA	$0.79	$0.04	$0.04	$0.24	$0.25	$0.04	$0.08	$0.00	$0.06	$0.00	$0.03	$0.01	$0.00
TOTAL	**$20.16**	**$4.33**	**$1.02**	**$5.75**	**$2.48**	**$3.67**	**$1.68**	**$0.21**	**$0.29**	**$0.00**	**$0.10**	**$0.50**	**$0.15**

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area.*

Source: Derived from mail-back survey data.

Table B-8. Average nonresident spending per visitor day to the Oroville Wildlife Area – Clay Pit by model area.

Model Area	Average Spending per Day	Spending by Sector[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$26.53	$3.73	$3.69	$3.97	$5.35	$1.85	$6.40	$0.02	$0.00	$0.00	$1.73	$0.09	$0.00
Paradise MA	$0.16	$0.00	$0.00	$0.00	$0.0	$0.00	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$3.44	$0.75	$0.44	$0.93	$1.10	$0.00	$0.15	$0.00	$0.00	$0.00	$0.07	$0.00	$0.00
Chico MA	$0.75	$0.00	$0.10	$0.02	$0.14	$0.00	$0.19	$0.00	$0.00	$0.00	$0.02	$0.29	$0.00
TOTAL	**$30.87**	**$4.47**	**$4.22**	**$4.92**	**$6.59**	**$1.85**	**$6.59**	**$0.02**	**$0.00**	**$0.00**	**$1.82**	**$0.38**	**$0.00**

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area*

Source: Derived from mail-back survey data.

Table B-9. Average local and nonlocal spending per visitor day to the Afterbay by model area.

Model Area	Average Spending per Day	Spending by Sector: Locals[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$30.34	$8.64	$0.00	$7.73	$0.09	$0.00	$4.50	$1.01	$4.09	$0.00	$3.53	$0.74	$0.00
Paradise MA	$40.70	$7.00	$0.00	$15.15	$3.25	$0.00	$5.05	$0.00	$6.50	$0.00	$3.75	$0.00	$0.00
Biggs-Gridley MA	$23.14	$5.92	$0.00	$6.63	$0.30	$0.00	$7.73	$0.00	$0.00	$0.00	$2.07	$0.30	$0.20
Chico MA	$33.57	$8.28	$0.22	$13.21	$0.17	$2.90	$2.26	$0.04	$2.64	$0.00	$1.30	$2.54	$0.00
		Spending by Sector: Nonlocals[1]											
Oroville MA[2]	$5.64	$1.56	$0.00	$2.55	$0.23	$0.00	$0.05	$0.01	$1.16	$0.00	$0.00	$0.00	$0.08
Paradise MA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$0.18	$0.00	$0.00	$0.00	$0.00	$0.00	$0.03	$0.00	$0.00	$0.00	$0.00	$0.15	$0.00

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area*

Source: Derived from mail-back survey data.

Table B-10. Average local and nonlocal spending per visitor day to the Forebay by model area.

Model Area	Average Spending per Day	Spending by Sector: Locals[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$42.93	$15.18	$1.32	$4.62	$3.38	$1.60	$8396	$1.54	$0.00	$0.00	$5.45	$0.65	$0.22
Paradise MA	$19.04	$9.09	$0.00	$3.76	$0.59	$0.79	$3.55	$0.28	$0.00	$0.00	$1.00	$0.00	$0.00
Biggs-Gridley MA	$6.05	$2.31	$0.00	$1.50	$0.00	$0.00	$2.24	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$16.09	$4.57	$0.00	$5.15	$0.00	$0.45	$2.86	$0.05	$0.99	$0.00	$1.86	$0.00	$0.16
		Spending by Sector: Nonlocals[1]											
Oroville MA[2]	$2.62	$0.90	$0.00	$0.27	$0.25	$0.24	$0.08	$0.20	$0.15	$0.00	$0.53	$0.00	$0.00
Paradise MA	$0.61	$0.17	$0.00	$0.16	$0.00	$0.00	$0.03	$0.00	$0.04	$0.00	$0.20	$0.00	$0.00
Biggs-Gridley MA	$0.03	$0.00	$0.00	$0.03	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$0.57	$0.13	$0.00	$0.05	$0.00	$0.00	$0.36	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area*

Source: Derived from mail-back survey data.

Table B-11. Average local and nonlocal spending per visitor day to the Upper Feather River – Diversion Pool by model area.

Model Area	Average Spending per Day	Spending by Sector: Locals[1]											
		A	B	C	D	E	F	G	H	I	J	K	L
Oroville MA[2]	$17.80	$4.34	$0.00	$5.15	$1.13	$0.10	$4.56	$0.03	$0.11	$0.16	$1.36	$0.85	$0.00
Paradise MA	$19.02	$2.07	$0.00	$12.24	$0.00	$0.00	$4.71	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$45.83	$0.00	$0.00	$25.00	$0.00	$0.00	$8.33	$0.00	$0.00	$0.00	$4.17	$8.33	$0.00
Chico MA	$15.65	$3.56	$0.00	$5.76	$0.00	$0.00	$6.33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Spending by Sector: Nonlocals[1]													
Oroville MA[2]	$12.56	$2.78	$0.00	$3.15	$1.99	$0.00	$2.83	$0.00	$0.00	$0.00	$1.11	$0.69	$0.00
Paradise MA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$0.54	$0.10	$0.00	$0.00	$0.21	$0.00	$0.23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area*

Source: Derived from mail-back survey data.

Table B-12. Average local and nonlocal spending per visitor day to Lake Oroville (reservoir only) by model area.

Model Area	Average Spending per Day	A	B	C	D	E	F	G	H	I	J	K	L
		Spending by Sector: Locals[1]											
Oroville MA[2]	$32.85	$8.15	$0.23	$8.59	$0.89	$1.43	$8.02	$0.63	$0.32	$0.00	$3.20	$1.03	$0.31
Paradise MA	$45.51	$9.47	$0.00	$11.75	$0.57	$3.20	$4.92	$0.30	$6.88	$0.00	$7.91	$0.39	$0.11
Biggs-Gridley MA	$24.93	$9.38	$0.00	$6.02	$2.86	$0.12	$1.08	$0.14	$0.00	$0.00	$3.43	$1.19	$0.71
Chico MA	$26.56	$8.35	$0.00	$7.96	$0.10	$0.42	$2.51	$0.09	$4.21	$0.00	$1.65	$1.28	$0.00
		Spending by Sector: Nonlocals[1]											
Oroville MA[2]	$8.14	$1.14	$0.26	$3.34	$0.63	$0.49	$0.77	$0.78	$0.31	$0.00	$0.36	$0.06	$0.00
Paradise MA	$0.72	$0.22	$0.00	$0.26	$0.02	$0.04	$0.07	$0.01	$0.07	$0.00	$0.00	$0.02	$0.00
Biggs-Gridley MA	$0.13	$0.04	$0.00	$0.01	$0.00	$0.00	$0.02	$0.00	$0.00	$0.00	$0.00	$0.02	$0.04
Chico MA	$0.83	$0.62	$0.00	$0.03	$0.00	$0.00	$0.17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
J = State government
K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area*

Source: Derived from mail-back survey data.

Table B-13. Average local and nonlocal spending per visitor day to the Oroville Wildlife Area – Clay Pit by model area.

Model Area	Average Spending per Day	A	B	C	D	E	F	G	H	I	J	K	L
		Spending by Sector: Locals[1]											
Oroville MA[2]	$44.58	$7.18	$0.00	$6.87	$3.14	$0.26	$11.92	$0.38	$3.85	$0.00	$8.10	$2.88	$0.00
Paradise MA	$23.17	$5.00	$0.00	$3.25	$0.00	$3.00	$1.20	$0.00	$2.00	$0.00	$8.72	$0.00	$0.00
Biggs-Gridley MA	$5.22	$1.67	$0.00	$2.22	$0.00	$0.00	$1.33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$246.45	$3.13	$0.00	$5.70	$0.00	$0.00	$27.13	$0.00	$0.00	$0.00	$5.50	$5.00	$0.00
		Spending by Sector: Nonlocals[1]											
Oroville MA[2]	$2.28	$0.44	$0.00	$0.23	$1.44	$0.00	$0.17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Paradise MA	$0.00	$0.11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Biggs-Gridley MA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Chico MA	$2.26	$0.24	$0.00	$0.36	$0.00	$0.00	$1.67	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

[1] *A = Food stores*
B = Lodging
C = Auto dealers and service stations
D = Eating and drinking establishments
E = Amusement and recreation services
F = Miscellaneous retail
G = Automobile parking and carwashes
H = Miscellaneous repair services
I = Local government
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K = Apparel and accessory stores
L = Other business services

[2] *MA – Model Area.*

Source: Derived from mail-back survey data.

APPENDIX C

Employment and Earnings Multipliers and Economic Impact Factors by Model Area

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TABLES

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EMPLOYMENT AND EARNINGS MULTIPLIERS AND ECONOMIC IMPACT FACTORS BY MODEL AREA

Employment and earning multipliers derived from the community-level and inter-community models are provided in Tables C-1 and C-2, respectively. The indirect and induced multipliers can be used to estimate the indirect and induced effects of a change in direct employment or earnings. The total multipliers can be used to estimate the total effect on employment and earnings in a community area and Countywide associated with a direct change in jobs or earnings.

Also included in this appendix (Table C-3) are economic impact factors that can be used to estimate the change in the total number of jobs, output (i.e., sales), and earnings associated with a change in final demand in sectors affected by recreation visitor spending. As shown in Table C-3, a $1.0 million change in sales by foods stores in the Oroville Model Area would result in a change of $1.48 million in output, $847,000 in earnings, and 43 jobs in the Oroville Model Area. In addition, this change in sales also would generate changes in output ($410,000), earnings ($174,000), and jobs (8) elsewhere in Butte County through inter-community linkages. The total change throughout Butte County of the $1.0 million in sales by food stores would be $1.89 million in output, $1.02 million in earnings, and 50 jobs.

Table C-1. Employment multipliers by model area for sectors affected by the Oroville Facilities.

Sector	Oroville Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.335	1.335	0.246	1.581
Automobile services	1.000	0.519	1.519	0.450	1.969
Apparel Stores	1.000	0.462	1.462	0.410	1.871
Eating and drinking establishments	1.000	0.271	1.271	0.251	1.522
Miscellaneous retail establishments	1.000	0.261	1.261	0.223	1.484
Motels and lodging places	1.000	0.380	1.380	0.362	1.742
Business services	1.000	0.467	1.467	0.536	2.003
Automobile parking and washing	1.000	0.506	1.506	0.430	1.935
Repair services	1.000	0.353	1.353	0.357	1.710
Recreation services	1.000	0.583	1.583	0.539	2.122
Local government	1.000	0.314	1.314	0.372	1.686
State government	1.000	0.560	1.560	0.442	2.002

Sector	Paradise Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.289	1.289	0.358	1.646
Automobile services	1.000	0.413	1.413	0.510	1.923
Apparel Stores	1.000	0.215	1.215	0.277	1.492
Eating and drinking establishments	1.000	0.173	1.173	0.263	1.436
Miscellaneous retail establishments	1.000	0.192	1.192	0.243	1.435
Motels and lodging places	1.000	0.301	1.301	0.395	1.697
Business services	1.000	0.402	1.402	0.504	1.906
Automobile parking and washing	1.000	0.204	1.204	0.249	1.454
Repair services	1.000	0.383	1.383	0.649	2.032
Recreation services	1.000	0.159	1.159	0.198	1.357
Local government	1.000	0.303	1.303	0.516	1.820
State government	1.000	0.495	1.495	0.620	2.116

Table C-1. Employment multipliers by model area for sectors affected by the Oroville Facilities, continued.

Sector	Chico Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.533	1.533	0.076	1.609
Automobile services	1.000	0.731	1.731	0.086	1.817
Apparel Stores	1.000	0.334	1.334	0.037	1.371
Eating and drinking establishments	1.000	0.336	1.336	0.038	1.374
Miscellaneous retail establishments	1.000	0.343	1.343	0.043	1.386
Motels and lodging places	1.000	0.533	1.533	0.054	1.587
Business services	1.000	0.781	1.781	0.079	1.860
Automobile parking and washing	1.000	0.397	1.397	0.052	1.449
Repair services	1.000	0.824	1.824	0.105	1.928
Recreation services	1.000	0.305	1.305	0.036	1.342
Local government	1.000	0.686	1.686	0.098	1.784
State government	1.000	0.765	1.765	0.102	1.867

Sector	Biggs-Gridley Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.185	1.185	0.313	1.498
Automobile services	1.000	0.251	1.251	0.482	1.732
Apparel Stores	1.000	0.141	1.141	0.265	1.406
Eating and drinking establishments	1.000	0.126	1.126	0.242	1.369
Miscellaneous retail establishments	1.000	0.122	1.122	0.227	1.350
Motels and lodging places	1.000	0.212	1.212	0.433	1.645
Business services	1.000	0.243	1.243	0.547	1.789
Automobile parking and washing	1.000	0.130	1.130	0.243	1.373
Repair services	1.000	0.270	1.270	0.612	1.883
Recreation services	1.000	0.103	1.103	0.199	1.303
Local government	1.000	0.062	1.062	0.123	1.185
State government	1.000	0.274	1.274	0.454	1.727

Table C-2. Earnings multipliers by model area for sectors affected by the Oroville Facilities.

Sector	Oroville Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.410	1.410	0.289	1.699
Automobile services	1.000	0.485	1.485	0.415	1.899
Apparel Stores	1.000	0.573	1.573	0.510	2.084
Eating and drinking establishments	1.000	0.571	1.571	0.506	2.076
Miscellaneous retail establishments	1.000	0.464	1.464	0.383	1.848
Motels and lodging places	1.000	0.604	1.604	0.576	2.180
Business services	1.000	0.776	1.776	0.951	2.728
Automobile parking and washing	1.000	0.696	1.696	0.598	2.293
Repair services	1.000	0.633	1.633	0.683	2.316
Recreation services	1.000	0.599	1.599	0.563	2.162
Local government	1.000	0.169	1.169	0.257	1.426
State government	1.000	0.315	1.315	0.248	1.563

Sector	Paradise Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.299	1.299	0.311	1.610
Automobile services	1.000	0.384	1.384	0.428	1.812
Apparel Stores	1.000	0.487	1.487	0.579	2.067
Eating and drinking establishments	1.000	0.399	1.399	0.546	1.945
Miscellaneous retail establishments	1.000	0.362	1.362	0.399	1.761
Motels and lodging places	1.000	0.486	1.486	0.601	2.087
Business services	1.000	0.695	1.695	0.914	2.608
Automobile parking and washing	1.000	0.561	1.561	0.633	2.194
Repair services	1.000	0.465	1.465	0.752	2.217
Recreation services	1.000	0.500	1.500	0.580	2.080
Local government	1.000	0.162	1.162	0.298	1.460
State government	1.000	0.304	1.304	0.334	1.638

Table C-2. Earnings multipliers by model area for sectors affected by the Oroville Facilities, continued.

Sector	Chico Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.444	1.444	0.061	1.505
Automobile services	1.000	0.603	1.603	0.068	1.672
Apparel Stores	1.000	0.691	1.691	0.072	1.763
Eating and drinking establishments	1.000	0.726	1.726	0.074	1.800
Miscellaneous retail establishments	1.000	0.561	1.561	0.067	1.627
Motels and lodging places	1.000	0.790	1.790	0.077	1.867
Business services	1.000	1.342	2.342	0.126	2.468
Automobile parking and washing	1.000	0.984	1.984	0.127	2.111
Repair services	1.000	0.908	1.908	0.110	2.017
Recreation services	1.000	0.881	1.881	0.101	1.983
Local government	1.000	0.429	1.429	0.061	1.490
State government	1.000	0.495	1.495	0.063	1.559

Sector	Biggs-Gridley Model Area			Spillover in Butte County	Butte County Total
	Direct	Indirect and Induced	Total		
Food stores	1.000	0.145	1.145	0.263	1.407
Automobile services	1.000	0.187	1.187	0.389	1.576
Apparel Stores	1.000	0.274	1.274	0.534	1.808
Eating and drinking establishments	1.000	0.258	1.258	0.485	1.743
Miscellaneous retail establishments	1.000	0.184	1.184	0.360	1.544
Motels and lodging places	1.000	0.300	1.300	0.625	1.925
Business services	1.000	0.388	1.388	0.945	2.333
Automobile parking and washing	1.000	0.319	1.319	0.589	1.908
Repair services	1.000	0.291	1.291	0.684	1.975
Recreation services	1.000	0.285	1.285	0.560	1.846
Local government	1.000	0.157	1.157	0.291	1.448
State government	1.000	0.172	1.172	0.294	1.466

Table C-3. Factors by model area for estimating employment and earnings effects from changes in final demand for recreation-related services.

Sector	Oroville Model Area					Spillover Effects in Butte County			Butte County Total		
	Direct Input ($1,000)	Indirect and Induced Impact ($1,000)	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs
Food stores	$1,000	$480	$1,480	$847	43	$410	$174	8	$1,889	$1,020	50
Automobile services	$1,000	$442	$1,442	$669	28	$434	$187	8	$1,876	$856	36
Apparel stores	$1,000	$462	$1,462	$627	32	$470	$203	9	$1,932	$830	41
Eating and drinking establishments	$1,000	$490	$1,490	$616	45	$472	$198	9	$1,962	$814	54
Miscellaneous retail establishments	$1,000	$452	$1,452	$709	47	$432	$186	8	$1,884	$894	55
Motels and lodging places	$1,000	$509	$1,509	$653	40	$532	$235	11	$2,041	$887	51
Business services	$1,000	$484	$1,484	$537	34	$629	$288	12	$2,113	$825	47
Automobile parking and washing	$1,000	$444	$1,444	$566	38	$602	$237	10	$2,046	$802	48
Repair services	$1,000	$552	$1,552	$656	37	$527	$231	11	$2,079	$887	48
Recreation services	$1,000	$531	$1,531	$686	32	$553	$241	11	$2,084	$928	43
Local government	$1,000	$505	$1,505	$925	32	$476	$204	9	$1,980	$1,128	41
State government	$1,000	$505	$1,505	$1,078	32	$476	$204	9	$1,980	$1,282	41

Table C-3. Factors by model area for estimating employment and earnings effects from changes in final demand for recreation-related services, continued.

Sector	Paradise Model Area					Spillover Effects in Butte County			Butte County Total		
	Direct Input ($1,000)	Indirect and Induced Impact ($1,000)	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs
Food stores	$1,000	$372	$1,372	$786	33	$443	$188	9	$1,815	$975	42
Automobile services	$1,000	$350	$1,350	$620	25	$448	$192	9	$1,799	$812	34
Apparel stores	$1,000	$398	$1,398	$592	48	$538	$230	11	$1,935	$822	59
Eating and drinking establishments	$1,000	$332	$1,332	$547	44	$521	$213	10	$1,852	$760	54
Miscellaneous retail establishments	$1,000	$357	$1,357	$658	45	$450	$192	9	$1,807	$850	54
Motels and lodging places	$1,000	$408	$1,408	$602	37	$560	$244	11	$1,968	$846	49
Business services	$1,000	$419	$1,419	$512	34	$624	$276	12	$2,043	$787	46
Automobile parking and washing	$1,000	$438	$1,438	$604	57	$572	$245	12	$2,011	$849	69
Repair services	$1,000	$329	$1,329	$508	25	$655	$260	12	$1,984	$768	37
Recreation services	$1,000	$432	$1,432	$641	69	$584	$248	12	$2,016	$889	81
Local government	$1,000	$405	$1,405	$870	27	$520	$223	11	$1,924	$1,092	37
State government	$1,000	$405	$1,405	$870	26	$520	$223	11	$1,924	$1,092	36

Table C-3. Factors by model area for estimating employment and earnings effects from changes in final demand for recreation-related services, continued.

Sector	Chico Model Area					Spillover Effects in Butte County			Butte County Total		
	Direct Input ($1,000)	Indirect and Induced Impact ($1,000)	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs
Food stores	$1,000	$629	$1,629	$867	37	$80	$37	2	$1,708	$904	39
Automobile services	$1,000	$648	$1,648	$726	31	$67	$31	2	$1,715	$757	33
Apparel stores	$1,000	$643	$1,643	$675	53	$63	$29	1	$1,706	$704	54
Eating and drinking establishments	$1,000	$738	$1,738	$695	52	$65	$30	1	$1,803	$724	54
Miscellaneous retail establishments	$1,000	$649	$1,649	$760	51	$70	$32	2	$1,719	$792	52
Motels and lodging places	$1,000	$742	$1,742	$728	44	$68	$31	2	$1,810	$760	46
Business services	$1,000	$924	$1,924	$716	44	$84	$39	2	$2,008	$755	45
Automobile parking and washing	$1,000	$876	$1,876	$768	67	$107	$49	2	$1,983	$817	69
Repair services	$1,000	$754	$1,754	$662	33	$83	$38	2	$1,836	$700	35
Recreation services	$1,000	$877	$1,877	$808	79	$94	$43	2	$1,971	$851	81
Local government	$1,000	$762	$1,762	$997	37	$92	$42	2	$1,853	$1,039	39
State government	$1,000	$762	$1,762	$997	37	$92	$42	2	$1,854	$1,039	39

Table C-3. Factors by model area for estimating employment and earnings effects from changes in final demand for recreation-related services, continued.

Sector	Biggs-Gridley Model Area					Spillover Effects in Butte County			Butte County Total		
	Direct Input ($1,000)	Indirect and Induced Impact ($1,000)	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs	Change in Output ($1,000)	Change in Earning ($1,000)	Change in Jobs
Food stores	$1,000	$217	$1,217	$691	30	$375	$158	8	$1,592	$849	38
Automobile services	$1,000	$210	$1,210	$535	22	$407	$175	9	$1,617	$710	31
Apparel stores	$1,000	$259	$1,259	$507	45	$492	$212	10	$1,751	$720	55
Eating and drinking establishments	$1,000	$267	$1,267	$493	43	$452	$190	9	$1,719	$683	52
Miscellaneous retail establishments	$1,000	$213	$1,213	$570	42	$404	$173	8	$1,617	$743	50
Motels and lodging places	$1,000	$290	$1,290	$527	35	$574	$253	12	$1,864	$780	47
Business services	$1,000	$283	$1,283	$420	30	$619	$286	13	$1,903	$706	43
Automobile parking and washing	$1,000	$287	$1,287	$510	54	$521	$228	12	$1,808	$738	65
Repair services	$1,000	$238	$1,238	$447	23	$597	$237	11	$1,836	$684	34
Recreation services	$1,000	$289	$1,289	$549	66	$548	$239	12	$1,837	$788	78
Local government	$1,000	$270	$1,270	$781	83	$460	$196	10	$1,731	$977	93
State government	$1,000	$270	$1,270	$781	27	$460	$196	10	$1,731	$977	37

Source (for Tables C-1, C-2, and C-3): Derived from the study's community-level and inter-community economic impact assessment models.

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